1UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

Date: November 15, 2004

MEMORANDUM

SUBJECT: **PENTACHLORONITROBENZENE (PCNB)**: Revised Occupational and Residential Exposure Assessment for the Reregistration Eligibility Decision Document.

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Please find the review of pentachloronitrobenzene (PCNB).

DP Barked: D291283

PC Codes: 056502

EPA Reg Nos: 10404-38, 100-792, 100-823, 10163-123, 10404-37,10404-38, 19713-312, 264-319, 264-475, 2935-208, 2935-357, 2935-362, 2935-419, 32802-36, 34704-287, 34704-44, 34704-679, 34704-680, 400-399, 400-400, 400-401, 400-402, 400-403, 400-404, 400-405, 400-406, 400-407, 400-408, 400-411, 400-412, 400-414, 400-453, 400-454, 400-455, 400-456, 400-457, 400-458, 400-475, 400-479, 48273-17, 51036-80, 38-096, 538-108, 538-116, 5481-197, 5481-211, 5481-212, 5481-214, 5481-215, 5481-279, 5481-308, 5481-311, 5481-415, 5481-419, 5481-441, 5481-442, 5481-443, 5481-444, 5481-445, 5481-450, 5481-453, 5481-457, 5481-464, 5481-465, 5481-471, 5481-472, 7401-163, 7401-197, 7401-389, 7401-42, 7401-84, 7501-111, 7501-126, 7501-131, 7501-139,7501-143,7501-145, 7501-148, 7501-153,7501-49, 7501-54, 7501-55, 7501-57, 7501-70, 7501-78, 501-139,7501-143,7501-145, 7501-148, 7501-153, 7501-49, 7501-54, 7501-55, 7501-57, 7501-70, 7501-78, 7501-87, 9198-152, AL-800010, GA-810003, GA-890003,GA-940007, ME-790001, OK-840009, OK-840011, OK-84008, OK-940001, PA-980001, TX-780043, TX-790017, TX-840015, TX-900010, TX-910007000, TX-940004

EXECUTIVE SUMMARY

This is a revision of the original Occupational and Residential Exposure Assessment and Recommendations Document for pentachloronitrobenzene (PCNB), (S. Tadayon July 15, 2004). This chapter has been revised to address comments made during public comment period by Gustafson LLC.

This document contains the occupational and residential exposure assessment for various uses of pentachloronitrobenzene (PCNB). The document also considers potential risk mitigation measures such as personal protective equipment (PPE) and engineering controls for handlers and proposed restricted entry intervals (REIs) for postapplication activities. The scope of the document covers all registered PCNB uses.

PCNB, is an organochlorine fungicide used for seed and soil treatments at planting. Registered use sites include, beans, brassica crops, cotton, garlic, hot pepper, peanut, pepper, potato, tomatoes, seed treatment, ornamental plants, cut flowers, dormant roses and bulbs, magnolia tree, southern pine seedlings and turf.

Application techniques identified to apply PCNB are: fixed -wing- aircraft (potato only), tractor-drawn equipment, dip tank, drencher, drill box, drip irrigation, duster, hand held sprayer, hose-end sprayer, liquid seed treater, mechanical sprayer; mist sprayer, overhead sprinkler irrigation, planter/seed box; seed treater, slurry-type seed treater, and hand held equipment. PCNB is formulated as manufacturing products, emulsifiable concentrate liquids, dusts/ powders, water dispersible granules, flowable concentrate, ready to use liquid and wettable powders. The application rates used in the assessment are intended to reflect the upper range of rates on the labels. Examples of the application rates used in this assessment include, but are not limited to the following: for agricultural uses the maximum rates for brassica crops is 30.0 lb ai/acre, potato rate is 25.0 lb ai/acre, cotton is 2.0 lb ai/acre pepper and tomato rates are 7.5 lb ai/acre, outdoor ornamental rate is 0.015 lb ai/gallon and turf is 43.6 lb ai/acre.

The Hazard Identification Assessment Review Committee (HIARC) selected the following endpoints for exposure risk assessment: short- and intermediate-term dermal NOAEL is 300 mg/kg/day short- and intermediate-term inhalation NOAEL is 1 mg/kg/day. based on liver and thyroid lesions seen in rats. An uncertainty factor or "target" margin of exposure (MOE) of 100 is based on 10x for differences among humans (intra species variability) and 10x for differences between the test animals and humans (inter species extrapolation). Thus MOEs of greater than 100 do not exceed the Agency's level of concern for occupational uses. The residential use includes a 10x FQPA safety factor and the or target MOE is 1000.

HED's Carcinogenicity Peer Review Committee (CARC) classified PCNB as a Group C - possible human carcinogen but not sufficient human carcinogenic potential, and therefore, the quantification of human cancer risk was not recommended

For agricultural uses, HED relied almost completely on surrogate data from the Pesticide Handlers Exposure Database (PHED) Version 1.1. For residential handler HED used the

ORETF study data and the Residential SOPs.

The results of the short- and intermediate-term seed handler assessments indicate that for all formulation the majority of the potential exposure scenarios provide total MOE(s) greater than or equal to 100 at the clothing attire of long pants, long sleeved shirts, gloves, and no respirator while using open systems. Seed handlers working in a smaller facility performing multiple activities might require respirator in order to have MOEs of greater than or equal to100. There is no separate measurement of exposure for various job function performed by seed handlers in a smaller facility, therefore it is not feasible to require respirator for workers treating seeds in a small operation to wear respirator as soon as they enter in to the facility.

The agricultural results of the short- and intermediate-term occupational handler assessments indicate that for the ***dry flowable formulation*** the majority of the potential exposure scenarios provide total MOE(s) greater than or equal to 100 at the baseline clothing. For the ***liquid formulation***, the risks indicate that in order for the mixer/loaders to achieve MOEs of 100 for all uses, the addition of chemical resistant gloves and dust mist respirator is required For the ***wettable powder formulation*** risks indicate that in order for the mixer/loaders to achieve MOEs of 100 some uses should be packaged in water soluble packets. The risk for the majority of uses with wettable powder is acceptable.

Chemical specific post-application exposure data have not been submitted by the registrant in support of reregistration of PCNB. However there is a low potential for occupational post-application exposure when a pre-plant or at planting fungicide is used. Many agricultural operations mechanically plant seeds early in the season, which minimizes the potential for contact. Significant exposure during harvesting or any other late season activities, is not likely since the chemical is applied pre- plant or at planting. However the Agency has determined that there are potential postapplication exposures to individuals re-entering PCNB treated areas for the purpose of mowing (roadsides, rights-of-way, golf course) and harvesting (sod farms).

The short- and intermediate-term risks to golf course workers or sod growers doing hand harvesting, transplanting, and hand weeding tasks does not exceed the level of concern on the day zero at the rate of 32.67 lbs ai/acre or 43.56 lbs ai/acre.

In residential settings, the Agency does not use personal protective equipment to limit exposures, because they are viewed as impractical and not enforceable. Risk estimates are based on handlers wearing short-sleeve shirts, short pants, shoes, and socks. Residential risks are of concern for a few scenarios, (i.e., MOE < 1000) for risk assessments. The scenarios where MOEs do not meet the Agency's target MOE include dermal and inhalation risk for mixing/loading/applying liquid with low pressure handwand and dermal and inhalation risk for garden hose-end sprayer and belly grinder.

Postapplication residential risk estimates on the day of application are the key concern The Agency considered a number of residential postapplication dermal exposure scenarios

including toddlers, youth-aged children, and adults. A postapplication oral risk assessment for incidental ingestion by toddlers was also conducted, considering an oral endpoint of 1 mg/kg/day. All assessed postapplication exposures to toddlers did not have MOEs greater than or equal to 1000.

EPA assessed postapplication risks to toddlers from incidental oral ingestion using a short-term and intermediate-term incidental oral endpoint (1 mg/kg/day) The results indicate that risks from short-term and intermediate-term exposures were a concern (i.e., MOE < 1000) for toddlers.

Overall Risk Summary

This risk assessment applied the latest exposure data, toxicology information, and use data. The overall results indicate that the Agency has risk concerns for some PCNB use-patterns involving agricultural crops. Residential handler and postapplication risks are of concern for some use-patterns and no practical risk mitigation measures are available to the Agency to reduce these risks.

1.0 BACKGROUND

Purpose

In this document, which is for use in EPA's development of the PCNB Reregistration Eligibility Decision Document (RED), EPA presents the results of its review of the potential human health effects of occupational and residential exposure to PCNB.

Criteria for Conducting Exposure Assessments

An occupational and/or residential exposure assessment is required for an active ingredient if (1) certain toxicological criteria are triggered and (2) there is potential exposure to handlers (mixers, loaders, applicators, etc.) during use or to persons entering treated sites after application is complete. For PCNB, both criteria are met.

1.1 Summary of Toxicity Concerns Relating to Agricultural and Residential Exposures

Acute Toxicology Categories

Table 1 presents the acute toxicity categories as outlined in the Hazard Identification Document (April 09, 2003).

Table 1: Acute Toxicity for PCNB

		UNIROYAL			AMVAC		
G- No.	**Study Type**	**MRIDs #**	**Results**	**Toxicity Category**	**MRIDs #**	**Results**	**Toxicity Category**
81-1	Acute Oral	43198201	LD_{50} = >5000 mg/kg	IV	41443101	LD_{50} = >5050 mg/kg	IV
81-2	Acute Dermal	43198202	LD_{50} = >5000 mg/kg	IV	41443102	LD_{50} = >2020 mg/kg	III
81-3	Acute Inhalation	43118201	LC_{50} = > 1.7 mg/L	III	41443103	LC_{50} = > 6.49 mg/L	III
81-4	Primary Eye Irritation	43198203	Slight irritant	III	41443109	Slight irritant	III
81-5	Primary Skin Irritation	43198204	Non irritant	IV	41443105	PII = 0.0175	IV
81-6	Dermal Sensitization	4060901	Weak sensitizer		45236401	Non sensitizer	

Other Endpoints of Concern

The report of the Hazard Identification Assessment Review Committee (HIARC) for

PCNB, dated April 9, 2003 identified toxicological endpoints of concern for PCNB. The endpoints and associated uncertainty factors used in assessing the risks for PCNB are presented in Table 2.

Table 2: Endpoints selected by HIARC for Assessing Occupational and Residential Risks for PCNB

Exposure Scenario	Dose Used in Risk Assessment, UF	Special FQPA SF* and Level of Concern for Risk Assessment	Study and Toxicological Effects
Short-Term Incidental Oral (1-30 days)	NOAEL= **1.0** mg/kg/day	**Residential** LOC for MOE = **1000** **Occupational** = **NA**	**90-Day Subchronic - Rat** LOAEL = **1.0** mg/kg/day based on **no toxicity at 30 days**
Intermediate-Term Incidental Oral (1-6 months)	NOAEL= **1.0** mg/kg/day	**Residential** LOC for MOE = **1000** **Occupational** = **NA**	**90-Day Subchronic - Rat** LOAEL = **1.0** mg/kg/day based on **threshold effects (liver and thyroid lesions) seen at the lowest dose tested**
Short- (1 to 30 days) and Intermediate-Term Dermal (1 to 6 months)	Dermal NOAEL= **300** mg/kg/day	**Residential** LOC for MOE = **1000** **Occupational** LOC for MOE = **100**	**21-Day Dermal - Rat** LOAEL =**1000** mg/kg/day based on **hypertrophy of the thyroid follicular epithelium and dilation of the thyroid follicles in males at 1000 mg/kg/day**
Long-Term Dermal (>6 months)	Oral NOAEL= **1.0** mg/kg/day (dermal absorption rate = **33**% of oral)	**Residential** LOC for MOE = **1000** **Occupational** LOC for MOE = **100**	**Chronic/Oncogenicity Study - rat** LOAEL = **150** mg/kg/day based on **hepatocelluar hypertrophy, hepatocellular hyperplasia, and thyroid hypertrophy**
Short-Term Inhalation (1 to 30 days)	Oral NOAEL= **1.0** mg/kg/day (inhalation absorption = 100% of oral)	**Residential** LOC for MOE = **1000** **Occupational** LOC for MOE = **100**	**90-Day Subchronic - Rat** LOAEL = **1.0** mg/kg/day based on **no toxicity at 30 days**
Intermediate-Term Inhalation (1 to 6 months)	Oral NOAEL = **1.0** mg/kg/day (inhalation absorption rate = 100% of oral)	**Residential** LOC for MOE = **1000** **Occupational** LOC for MOE = **100**	**90-Day Subchronic - Rat** LOAEL = **1.0** mg/kg/day based on **threshold effects (liver and thyroid lesions) seen at the lowest dose tested**
Long-Term Inhalation (>6 months)	Oral NOAEL= **1.0** mg/kg/day (inhalation absorption rate = 100% of oral)	**Residential** LOC for MOE = **1000** **Occupational** LOC for MOE = **100**	**Chronic/Oncogenicity Study - rat** LOAEL = **150** mg/kg/day based on **hepatocelluar hypertrophy, hepatocellular hyperplasia, and thyroid hypertrophy**
Cancer (oral, dermal, inhalation)	HED's Carcinogenicity Peer Review Committee (CARC) classified PCNB as a Group C - possible human carcinogen.		

UF = uncertainty factor, FQPA SF = Special FQPA safety factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, PAD = population adjusted dose (a = acute, c = chronic) RfD = reference dose, MOE = margin of exposure, LOC = level of concern, NA = Not Applicable

1.2 Summary of Use Patterns and Formulations

Products containing PCNB are used in both occupational and residential settings.

Type of pesticide/target pests

Pentachloronitrobenzene (PCNB), is an organochlorine fungicide used for seed and soil treatments at planting. Registered use sites include, beans, brassica crops, cotton, garlic, hot pepper, peanut, pepper, potato, tomatoes, seed treatment, ornamental plants, cut flowers, dormant roses and bulbs, magnolia tree, southern pine seedlings and turf.

PCNB, has trade names including Terraclor, Terraclor Super X and Turfcide. The common fungi controlled by PCNB are, black root (*Corticium solani*), black rot of bulbs (*Sclerotinia*), Camellia flower blight (*Sclerotinia*), club root (*Plasmodiophora*), common bunt/stinking smut (*Tilletia foetida*/ *T. caries*) of wheat, leaf spots, loose smut of oat (*Ustilago avenae*), melting out (*Drechslera poae*), melting-out (*Helminthosporium*), neck rot (*Stromatinia/ sclerotinia*) and needle blight (*Dothistroma*).

Formulation types and percent active ingredient

In addition to the technical grade manufacturing product (95.0 -96.0 percent active ingredient), PCNB is available in the following formulations:2 granular, twenty six emulsifiable concentrate liquids (up to 24.0 percent active ingredient), nine dust powder (up to 30 percent active ingredient), two water dispersable granules (up to 75 percent active ingredient), fourteen flowable concentrates (up to 53.5 percent active ingredient), two soluble concentrate (up to 24 percent active ingredient), one ready to use liquid (20 percent active ingredient) and thirteen wettable powders (up to 75 percent active ingredient). Table 3 contains the EPA registered products for PCNB. (See table 3 for details)

Table 3: Summary of Active PCNB Products

PRODUCT NAME	% ACTIVE INGREDIENT	EPA REG No.	PRODUCT NAME	% ACTIVE INGREDIENT	EPA REG No.
Ridomil Gold PC GR	10	100-823	80% PCNB	80	5481-438
Gowan PCNB 10 G	10	10163-123	PCNB 75DG	75	5481-441
Lesco 10-3-23 + PCNB	12.5	10404-37	PCNB Flowable RTU Seed Protectant	21.6	5481-442
Lesco PCNB - 10%	10	10404-38	Parflo 2F	21.6	5481-443
Drexel PCNB 2-E Liquid	24.0	19713-312	PCNB 10G	10	5481-444
Temik TSX	10	264-319	PCNB ST	20.0	5481-445
MOCAP PCNB 3-10	10	264-475	PCNB 20% WDG Soil Fungicide	20	5481-450
PCNB 2 Spray	24.0	2935-208	PCNB75 WSP	75	5481-453
PCNB10 Granular	10	2935-357	Turfpro WSP	75	5481-457
Disyston 6.5 + PCNB6.5 Soil Fung.	6.5	2935-362	Parflo 6F Turf Soil Fungicide	53.5	5481-464
PCNBSeed-Coat	24.0	2935-419	Parflo 4F Turf Soil Fungicide	38.3	5481-465
Soil Fungicide	10	32802-36	Win-Flo 6F	53.5	5481-471
Dot-Son Brand Stand-Aid	6.5	34704-287	Win-Flo 4F4 lbs ai/gal	38.3	5481-472
Clean Crop PCNBSeed Treater	25	34704-44	Ferti-Lome A-C-G	12.5	7401-163
PCNB+ Liquid Seed Treater	23.2	34704-679	Ferti-Lome	4.67	7401-197
PCNB2EC-LF Liquid Seed Treater	24.0	34704-680	Hi-Yield Terraclor Fungicide	4.67	7401-389
Terraclor 75 WP	75	400-399	Ferti-Lome	24.0	7401-42
Terraclor 2LB Emulsifiable	23.8	400-400	Ferti-Lome	24.0	7401-84
Terrachlor 10%G	10	400-402	Rival Flowable	8.4	7501-131
Greenback Lawn Fungicide	24.0	400-403	Vitavax-PC Peanut Seed Treatment Fungicide	15	7501-139
Turfcide 2 Lb. Emulsifiable	24.0	400-404	PREVAIL: Apron-Terraclor-Vitavax	15	7501-145
Terraclor Super X Emulsifiable	23.2	400-405	Kodiak AT	16.67	7501-148
Terraclor Super X Granular	10	400-406	4-Way Peanut Seed Protectant	10	7501-153
Turfcide 10% Granular	10	400-407	Terraclor 80% Dust	80	7501-49
Terrachlor Super X With Dy-Syston	6.5	400-408	Terraclor Super-X 20-5 Dust c/ Graphite	20	7501-54
Terraclor 6.5% Plus Di-Syston 6.5%	6.5	400-411	Terra-Coat LT 2N	23.7	7501-55
Terraclor 6.5% Plus	6.5	400-412	Terra-Coat L-2N	23.1	7501-57
Technical	90	400-414	RTU-PCNBSeed Protectant	24.0	7501-70
Terraclor Flowable	40.0	400-453	Vitavax-PCNBFlowable Fungicide	17.0	7501-87
Turfcide 4F	40.0	400-454	Andersons PCNBGranular Plus Fertilizer	15	9198-152
Terraclor Super X	23.2	400-455	Terraclor 2 LB Emulsifiable Soil Fungicide	24.0	AL-800010
Terraclor Super X 18.8G	15	00-456	Terraclor 2 LB Emulsifiable Soil Fungicide	10.0	GA-810003
Turfcide 15G	15	400-457	Terraclor 10% G	10	GA-890003
Terraclor 15G	15	400-458	Terraclor Flowable	40.0	GA-940007
Terraclor Super X plus DiSyston EC	17.5	400-475	Terraclor 75% WP75	75	ME7900010
Turfcide WDG	75	400-479	Terraclor 2 LB Emulsifiable Soil Fungicide	23.8	OK-840009
MARMAN PCNB75% WP	75	48273-17	Terraclor 10% G	10	OK-840011
PCNB-M 10-3G	10	51036-80	Terraclor 75% WP	75	OK-84008
Scotts Lawn Disease Preventer	10	538-096	Terraclor Flowable	40	OK-940001
Scotts' Proturf 14-3-3- FFII	15.4	538-108	Terraclor 400	40	PA-980001
Scotts' Lawn Disease Preventer…	9.95	538-116	Terraclor 10% G	10	TX-780043
Technical grade PCNB	95	5481-197	Terraclor 75% WP	75	TX-790017
PCNB10% Granules	10	5481-211	Terraclor 2 LB Emulsifiable Soil Fungicide	23.8	TX-840015
PCNB2-E Liquid EC	24.0	5481-212	PCNB2-E Liquid Emulsifiable Concentrate	24.0	TX-900010
PCNBSoil & Turf Liquid Drench	24.0	5481-214	TOPS PC Peanut Seed Treatment	15	TX-9100070
PCNB2 LF	20.0	5481-215	Terraclor Flowable	75.0	TX-940004
PCNB75% WP	75	5481-279	4-Way Seed Protectant	10	7501-111
PCNB-Thiram 30:30 Seed Treatment	30	5481-308			
PCNB-Thiram 10:10 Seed Treatment	10	5481-311			
PCNBDisulfoton 6.5:6.5 Granules	6.5	5481-415			
PCNB75W	75	5481-419			

Registered use sites, application rates and frequency of application

Table 4 represent summary information on registered use sites, application rates and frequency of application per growing season for PCNB. Application rate covers various type of equipment used to apply PCNB. Refer to appendix A for a comprehensive use information.

Table 4: Use Patterns, Application Rate, and Frequency of Application for PCNB

Crops	Application Rate lb ai/acre	Frequency of Timing of Application
Agricultural Usage Patterns		
Beans: Bush Beans Dry/green + bush/pole Dry/succulent/snap Not specified Pole Beans Snap/Dry + Bush Snap/Dry + Pole	 1.5 to 2.1 lbs ai/A 1.1 1.1 to 1.5 1.36 to 1.5 1.5 to 2.1 1.5 to 2.1 1.7 to 2.1	At planting
Brassica Crops: Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Chinese Broccoli, Chinese Cabbage, Collards, Kale, Mustard Greens	30 lbs ai/A (Transplant solutions: 4.5 lbs ai/A)	Pre planting or at planting
Cotton Cotton Seedling	0.93 to 2.1 lbs ai/A 0.3 to 1.5	At planting
Garlic (in furrow and clove mist spray)	20 to 20.6 lbs ai/A	at planting
Hot peppers	1.3 to 1.5 lbs ai/A	At planting
Peanuts	2 to 10 lbs ai/A (plus: aircraft - 10 lb ai/A)	At planting and early pegging
Peppers	7.2 to 7.5 lbs ai/A Transplant Solution: 3.5 lbs ai/100 gal	At planting
Potatoes	10 to 25 lbs ai/A	Preplant
Tomatoes	7.2 to 21.78 lbs ai/A	Preplanting or at planting
Seed Treatment	0.0375 to 0.253 lb ai/ 100 lbs seed	Preplant
Ornamental Usage Patterns		
Azalea/Camellia Plants	217.8 to 290.4 lbs ai/A	Preplanting or at planting
Bulbs Dutch Iris Easter Lily, Hyacinth, Iris, Narcissus, Tulip Gladiolus Lily - various	 147 to 150 lbs ai/A 196 to 212.4 98 to 185.1 212.4 [Transplant solutions: 1.5 lb ai/100 gallons to 1.5 lb ai/ 3.2 gal] [Bulb soak: 4.5 lb ai/100 gal]	At planting

Cut Flowers: spray/dip	1.5 lb ai/ 100 gal	Prior to storage
Dormant Roses & Bulbs: spray/dip	4.5 lb ai/ 100 gal to 1.5 lbs ai/3.2 gal	Pre plant or pre storage
Magnolia Tree: Foliar spray	1.5 lb ai/ 100 gal/ or 6 lb ai/A	At least 4 sprays at 2 weeks intervals
Southern Pine Seedlings	36.8 to 38.1 lbs ai/A (37.5 typical)	Pre plant
Ornamental Plants: Bedding Plants Calendula/Larkspur/Snapdragon/ Sweet Peas Dutch Iris Easter Lily Flowering Bedding -broadcast -soil drench -bench soil Flower & Foliage Flower, Foliage, Shrub, Tree Flower/Foliage/Woody& Bedding Foliage Gladiolus Hyacinth/Iris/Narcissus/Tulip Lilies Tropical Foliage Vegetable Bedding Woody & Herbaceous	 40.8 lbs ai/A 100 to 119.6 to 375 (1/10) 16.4 to 200 200 10.2 to 87.12 10.2 to 102.1 65.3 196.0 130.7 7.14 to 114.3 87.12 (growing media mix) 120 212 212.4 40.8 40.84 40.8 to 87.1	Pre planting or at planting
Turf: Turf Home Lawns Commercial Turf: Commercial & Home	 32.7 to 43.1 lbs ai/A 21.7 to 32.7 21.3 32.7 to 43.6	 More reapplication at lower rate Reapplication at 3 to 4 weeks interval

Table 5 represent information on registered use sites, application rates for **seed treatment** uses. Application rate covers various type of commercial seed treater and seed planters used to apply PCNB.

Table 5. Application Rate for seed, seed piece, and cloves

Application Rate lbs ai/100 lbs seed (Commercial)				Application Rate lbs ai/100 lbs seed (On- Farm)		
crop	minimum	typical	maximum	minimum	typical	maximum
barley	0.0394	0.1045	0.1307	0.0390	---	0.0878
bean		0.0256-0.0523		0.0347	—	0.0750
corn		0.0523		0.0372	---	0.0558
cotton	0.0656	0.07880	0.2526	0.0750	0.0750-0.1250	0.150
garlic	—	—	---	—	—	---
oats	0.0394	0.0977-0.1045	0.1957	0.0302	—	0.0604
pea	0.0523		0.1045	0.0521	—	0.1042
peanut	0.0305	0.0375-0.0523	0.0610	0.0375	0.0375-0.0417	0.0750

potato	—	—	---	—	—	---
rice	—	—	---	0.0417	—	0.0926
safflower	—	—	---	—	—	---
sorghum	—	0.0305	---	—	—	---
soybean	0.0256	0.0256-0.0525	0.1045	0.0695	—	0.1044
sugar beet	0.0958	—	0.1873	0.0313	—	0.0625
wheat	0.0256	0.0256-0.0523	0.0525	0.0347	—	0.0521

1.3 Methods and Types of Equipment Used for Mixing/Loading/Applying

HED determines potential exposures to pesticides handlers by identifying exposure scenarios from the various application equipment-types that are recommended on PCNB labels. Based on reviewing pesticide labels and a use meeting with the registrants residential and agricultural use patterns specific to PCNB are associated with the following application equipment:

Agricultural Uses:

- Chemigation
- Ground boom sprayer
- Airblast sprayer
- Push type spreader
- Tractor drawn spreader
- Aerial application

Seed Treatment Uses:

- Commercial seed treater
- On farm seed treatment
- Planter/seed box

Residential Uses:

- Push-type spreader
- Belly grinder,
- Hose- end sprayer
- low- pressure handwand

1.4 Incident reports

According to the *Recognition and Management of Pesticide Poisoning,* 5 th edition, symptoms of prolonged exposure to PCNB can include: skin sensitization and irritation, conjunctivitis and keratitis following eye contamination. Systemic poisoning has not been reported. Clearance is chiefly via the liver and biliary excretion. For the reporting period 1993-1998, there were 41 cases reported in the AAPCC surveillance systems. There were 21 symptomatic cases, including 6 ranked moderate. Of the 41 cases, 15 were seen in a health care facility, and 1 was hospitalized.

From 1982-1997, there are a total of thirty PCNB case reports in the California Pesticide Illness Surveillance Program. Many of these include PCNBin mixtures with other pesticides. Of the seven case reports that are for PCNB alone, most are older cases and related to eye contamination. In the 1984-1991 inclusive NPTN ranking of the top 200 active ingredients, PCNBis164 (Ruth H. Allen. February 4, 2003).

2.0 SEED TREATMENT USES

There are a number of methods that can be used to treat seeds both commercially and on-farm. On-farm seed treatment methods include concrete tumbler, drill box, duster, in-furrow, mist-type seed treater, planter/seed box, seed treater and slurry-type seed treater. Commercial seed treatment equipment produced by Gustafson include computerized seed and chemical Proportioner, Gustafson Accu-Treat Treater, Gustafson S-Series and SS-Series, Gustafson SS-AMP Treater, and Triple Treat Seed Treater.

On-farm seed treatment is considered, by most sources, to represent a relatively small proportion of the total use of treated seed in the U.S. This may be due, in large part, to the greater time investment, labor and equipment commitment required for on-farm seed treatment compared to buying the treated. However, some seed crops record a sizable percentage of on-farm seed treatment. A risk assessment for on-farm seed treatment (planter box) is completed in this document using a dust formulation study. The dust formulation study is the only on-farm seed treatment study available, and is used as a surrogate for planter box seed treatment with liquid formulation. The planter box seed treatment with liquid formulation risk assessment for liquid is considered conservative since treatment with dust formulations usually present a higher risks than liquids. There are no data for other seed treatments done on-farm.

There is a significant exposure to the workers planting treated seed. An Exposure assessment is presented for workers loading treated seed into plant hoppers and driving a closed cab tractor to pull the planter around the field.

Exposure Data Used In Seed Treatment Assessment

Commercial, on-farm seed treatment and planters exposure was addressed using Science Advisory Council Exposure Policy 14 (May, 2003), seed treatment Standard Operating Procedure (SOP). This database was created by U.S. EPA, and measures exposure values for seed treaters and planters under actual field conditions.

Commercial Seed Treatment

For commercial assessment four standard scenarios were assessed.

1) Loader/Applicator

The loading/applying of all formulation (except liquid closed system and wettable powder) is comprised of 3 exposure studies (MRID # 43080049, 42251902, 44731501). The loader/applicator activities in these 3 exposure studies encompass a wide range of seed treater, amount of seed and amounts of pesticides handled for seed treatment scenarios.

The three studies in this scenario monitored an open loading/applying activity for various

seed treatment facilities. There are an average of 9 replicates per study (ranging from 1 to 20 replicates per study). Two of the three studies monitored dermal exposures with patch dosimetry for hand rinses and face wipes. The methodology in the third study was whole body dosimetry, hand rinses and face wipes.

In the study with MRID # 430800-49, 20 replicates were monitored. Each replicate was a minimum of 3.5 hours. This study involved the treating of soybean seed with Apron using a Gustafson seed treaters at two facilities in the Midwest. The chemical was manually added to the mix tanks from 1 gallon jugs (15 replicates) or 3 lb water soluble bags (5 replicates). 12500 lbs of seed were treated per hour. Dermal exposure was measured using whole body dosimeters, handwashes and face wipes. Inhalation exposures were measured with glass fiber filters and XAD tubes. Field recovery was grade A for the handwashes and air filters and grade AB for the face wipe and whole body dosimeters.

In the study with MRID # 422519-02, 6 replicates were monitored. The average duration of each replicate was 7.4 hours. This study involved the treating of canola with Oftanol technical at one facility in Canada with a 150 kg batch blending machine. The chemical was pumped to the mixing tank from a 55 GA drum. Each batch took five minutes. Dermal exposure was measured using patches and handwash. Inhalation exposures were measured using quartz microfiber filters. Field fortification recovery was grade A for all media.

In the study with MRID # 447315-01, 2 replicates were monitored (only 1 replicate was included in the data base due to inadequate lab recovery). This study involved the treating of canola with Vivavax RS flowable at one facility in Canada with a Gustafson Accu-treat film coater. The chemical was transferred to the mixing tank from a tote. Dermal exposure was measured using patches, handwashes, glove washes and face washes. Inhalation exposures were measured with glass fiber filters and XAD tubes. Field fortification recovery was grade AB for dermal media. The field recovery for the inhalation media was 220 percent. The laboratory recovery was grade A for both the dermal and inhalation all media.

2) Bagger

The bagging system for all formulation (except liquid closed system and wettable powder) is comprised of 3 exposure studies (MRID # 43080049, 42251902, and 44731501) for the dermal and inhalation. The bagging in these studies encompass a wide range of bagging equipment, amount of seed and amounts of pesticides handled for seed treatment scenarios.

The three studies in this scenario monitored bagging treated seed in various seed treatment facilities. The number of replicate ranges from 1 to 20 per study. Two of the three studies monitored dermal exposures with whole body dosimeter, face and neck and hand rinses. The methodology in the other three studies was dermal patches and hand rinses.

In the study with MRID # 430800-49, 20 replicates were monitored The same bagging method was used at both facilities. The bagger clamped an empty bag to the bagging machine

and the treated seed dropped into the bag. The seed flow stopped automatically and the filled bag dropped onto a conveyor belt.

In the study with MRID # 422519-02, 3 replicates were monitored The treated seed was transferred to a bagging hopper after passing through a compactor and shaker screen. The bagger attached a bag to the hopper and filled the bag. The bagger then removed the bag, carried it to a sewing station and sewed it with a hand held sewer.

In the study with MRID # 447315-01, 1 replicate was monitored This replicate was sampled during bag filling. Methods were the same as for the loader/ applicator with the exception that a full body dosimeter was used instead of patches.

3) Sewers

The sewing system for seed treated with all formulation (except liquid closed system and wettable powder) is comprised of 2 exposure studies (MRID # 430800-49, and 447315-01) for the dermal and inhalation.

The two studies in this scenario monitored sewing various bags of treated seed in a number of seed treatment facilities. The number of replicate ranges from 1 to 20 per study. All of the studies monitored dermal exposures with whole body dosimeter, face and neck and hand rinses.

In the study with MRID# 430800-49, 20 replicates were monitored. The same sewing method was used at both facilities. The sewer grabbed the bag, attached ID tags and guided it through the sewing and stamping machines.

In the study with the MRID # 447315-01 one replicate was monitored. This replicate was sampled during bag filling. Methods were the same as for the loader/ applicator with the exception that a full body dosimeter was used instead of patches

4) Multiple Activities (e.g., loader/applicator, bagger, sewer, cleaner, calibrator, repair, forklift driver, etc).

In the smaller, less automated facilities, one worker will often have multiple duties within the plant. Therefore, seed treatment SOP contains a scenario labeled “Multiple Activities” in order to address this aspect of small commercial operations.

The multiple activities for all formulation (except liquid closed system and wettable powder) is comprised of 4 exposure studies (MRID #s, 454427-01, 422519-02, 449045-26 and 447315-01) for the dermal and inhalation. The multiple activities in these studies encompass a wide range of seed treater, amount of seed and amounts of pesticides handled for seed treatment scenarios.

The 4 studies in this scenario monitored multiple activities for various seed treatment facilities. The number of replicates ranges from 3 to 45per study). Three of the four studies monitored dermal exposures with whole body dosimeter, face and neck and hand rinses. The methodology in the other study was dermal patches and hand rinses.

In the study with MRID # 454427-01, 20 replicates were monitored. This study involved the treating of rice at three sites in the south with ICON 6.2 FS aqueous flowable using Gustafson PSD50-D3 treaters. A total of 45 workers were monitored with an average replicate time of 6.3 hours. These worker performed mixing/loading, bagging and clean-up. The product was added to the mix tanks from a 30 gallon containers. The rice seed was dumped through the seed treater and stored in a bin until bagged. Dermal exposure was measured with whole body dosimeters, handwash and face/neck wipes. Inhalation exposures were measured with 37 mm filters and adsorption tubes. Dermal field recoveries were grade AB. Inhalation recoveries were grade A.

In the study with MRID # 422519-02, 3 replicates were monitored. The shift foreman supervised the process and assisted with various tasks as necessary.

In the study with the MRID # MRID 449045-26, 12 replicates were monitored This study involved the treating of wheat, barley, oats and peas at two sites in Canada using Vitaflow 280 packaged in 1000 liter totes or Vivavax Single packaged in a 200 liter drums. The replicates were one half day in length and involved a total of 5 workers. Workers loaded the formulation into the seed treater, operated the seed treater, bagged treated seed, transferred treated seed to storage bins or trucks, cleaned up the seed treatment area and cleaned up treated seed storage bins or the bagging area. Dermal exposure was measured with whole body dosimeters and cotton gloves. Inhalation exposures were measured with millipore filters. The dermal field fortification samples had highly variable recoveries possibly due to contamination.

In the study with MRID 447315-01, 6 replicates were monitored. 2 replicates stacked bags, 3 replicates did all tasks and 1 replicate did all tasks except loading.

On- Farm Seed Treatment

The on- farm system for dust formulation subset is comprised of 1 exposure study (MRID # 44031611) for the dermal and inhalation.

In this study four workers (twelve replicates) mixed and applied **dust** formulations to winter wheat in grain drills at an application rate of 2 oz. per 120 lbs. of seed. Each replicate lasted between 19 and 33 minutes and each worker handled 22.5 ounces of active ingredient per work period. Workers loaded seed drill hoppers with wheat seed and a lindane/maneb dust formulation. Dermal exposures were measured with patches and handwash. Inhalation exposures were measured with glass fiber filters. The field recovery was grade A for all media.

Planters

The planters system for all treated seed is comprised of 2 exposure studies (MRID # 42251901, 45654503) for dermal and inhalation.

In the study with the MRID # 456545-03, 13 replicates were monitored. Workers involved in the loading and drilling of seed treated with Baytan. The replicates were all located at different sites in the UK. The seed was loaded into the drill hoppers from 0.5 or 1 ton supersacks or 50 kg bags. The amount of seed handled ranged from 1100 to 12,100 lbs and the amount of ai handled ranged from 0.35 to 4.72 lbs. The loading time ranged from 19 to 83 minutes while the planting time ranged from 155 to 487 minutes. The seed planting rate per acre was not given in the review. The same worker performed both the loading and planting. Dermal exposure was measured with inner and outer whole body dosimeters which included a cap, a jacket and trousers over a long sleeve T-shirt and long johns and two sets of cotton gloves. The gloves were changed at the end of loading. Inhalation exposures were measured with 37 mm glass fiber filters and the filters were changed after loading. The dermal results were adjusted by a clothing protection factor to account for the fact that 5% of the outer residues was found on the inner dosimeters. Dermal and inhalation field recoveries were grade A.

In the study with the MRID # 422519-01, 13 replicates were monitored. Workers involved in the loading and drilling of canola seed treated with Oftanol which forms a hard shell coating. The replicates were located at one site in Manitoba using four different planting rigs. Four workers participated in the study and the replicates averaged 3.2 hours in duration. The seed was loaded into the drill hoppers from 25 kg bags. The amount of seed handled per replicate averaged 360 pounds and the amount of ai handled averaged 4.33 lbs. The seed was planted at a rate of 6 to 8 pounds per acre. The same worker performed both the loading and planting. Dermal exposure was measured with patches located both inside and outside the worker's coverall. Hand exposures were measured by handrinse. Inhalation exposures were measured with 37 mm quartz microfiber filters. Dermal and inhalation field recoveries were grade A.

2.1 Occupational Seed Handler Exposures

There are potential exposures to loader/applicator, baggers, sewers, workers performing multiple activities, on-farm treatment with planter box and seed planters during usual use-patterns associated with PCNB. Based on the use patterns and potential exposures described above, 6 exposure scenarios are identified to represent the extent of PCNB seed treatment uses.

The potential seed treatment handler exposures to 6 exposure scenarios are assessed in this RED chapter using the toxicological endpoints and uncertainty factors associated with the active ingredient.

2.1.1 Summary of Uncertainties

The seed handler exposure assessments encompass all of the major seed treatment uses of PCNB throughout the country. The assumptions and uncertainties are identified below to be used in risk management decisions:

- *Application Rates:* The application rates are the maximum allowable that were identified on the available product labels.

- *Amount Handled:* The daily lbs treated or the daily lbs/A planted are provided to HED by BEAD and registrant.

- *Unit Exposures:* The unit exposure values in seed treatment SOP generally range from the geometric mean to the median for the selected data set.
  The caveats specific to each exposure scenario are summarized in Appendix D, Table D3. While data from seed treatment SOP provides the best available information on seed handler exposures, it should be noted that some aspects of the included studies (e.g., duration, lbs of seed treated, pounds of active ingredient handled) may not accurately represent labeled uses in all cases.

2.1.2 Seed Handler Risks

Table 6 presents the exposure scenarios, amount treated and amount planted (i.e., lbs of seed or lbs/A planted) that have been used in the exposure calculations. PCNB labels include a multitude of uses and a wide range of application rates. Therefore, the rates presented in Table 6 are not all inclusive and an attempt has been made to assess a range of application rates to capture exposure associated within each scenario.

Seed treatment data base consists of 6 exposure scenarios. The assumptions in this data base are based on the fact that the magnitude of handler exposures to pesticides are primarily a function of activity (e.g., loader/applicator, baggers, sewers), and clothing scenarios (e.g., gloves, double layer clothing). Data are selected for a given scenario and normalized (i.e., divided by) by the amount of pesticide handled resulting in standard unit exposures (milligrams of exposure per pound of active ingredient handled). Following normalization, the data are statistically summarized. The distribution of exposure values is categorized as normal, lognormal, or "other" (i.e., neither normal nor lognormal). A central tendency value is then selected from the distribution of the exposure values for each activity. These values are the geometric mean for lognormal distributions, and the median for all "other" distributions and are presented in table 7.

Table 6: Amount of seed treated or planted with PCNB							
Seed Type	**Application rate lb ai/lb seed Commercial***	**Application rate lb ai/lb seed on-farm****	**Amount Treated/day for Commercial seed Treatment[1]**	**Amount Treated/day for on-farm Treatment[4] (planter box)**	**Amount of seed planted lb/acre[2]**	**Acres planted /day[3]**	**amount of seed planted per day (lbs)**
barley	0.001307	0.000878	718000	7200	90	200	18000
bean	0.000523	0.000750	575000	4000	50	200	10000
corn	0.000523	0.000558	550000	1440	18	200	3600
cotton	0.002526	0.00150	160000	1200	15 (adl)	200	3000
				3200	40 (rg)		8000
oats	0.001957	0.000604	718000	7200	90	200	18000
pea	0.001045	0.001042	575000	6400	80	80	6400
peanut	0.000610	0.000750	120000	9280	116	80	9280
rice	0.001391	0.000926	718000	12000	150	200	30000
safflower	0.00061	NA	718000	2400	30	80	2400
sorghum	0.000305	NA	718000	640	8	80	640
soybean	0.001045	0.001044	575000	4800	60	200	12000
sugar beet	0.001873	0.000625	120000	400	5	80	400
wheat	0.000525	0.000521	718000	9600	120	200	24000

* Liquid formulation only
** Dust formulation only
1: Derived from the Gustafson Efficiency Guide. Values are for the Accu-Treat Treater for small grains, cotton and corn and the AMPD Treater for peanuts.
2: Maximum values provided by Dr. Bernard Schneider of EPA.
3: Based upon ExpoSAC Policy 9 "Standard Values for Daily Acres Treated in Agriculture".
4: Amount of seed planted per acre times acres planted per day (80 acres assumed for all crops) .

Calculations of Exposure

Potential daily dermal exposure is calculated using the following formula:

Daily Dermal Exposure (mg ai/day) =

Dermal Unit Exposure (mg ai/lb ai) x Application Rate (lb ai/lb of seed) x Daily amount Treated (lbs)

Potential daily inhalation exposure is calculated using the following formula:

Daily Inhalation Exposure (mg ai/day) =

Inhalation Unit Exposure (mg ai/lb ai) x Application Rate (lb ai/lb of seed) x Daily amount Treated (lbs)

These calculations of potential daily exposure to PCNB by seed treatment handlers are used to calculate the absorbed doses and total risk to those handlers.

Calculation OF Risk

Using the daily dermal exposure scenarios identified in the exposure section, HED calculated the potential risk to persons from handler exposures.

The inhalation and dermal daily doses were calculated using the following formulas:

Daily dermal dose (mg/kg/day) = daily dermal exposure(mg ai/day)/body weight(kg) x dermal absorption factor(100%)

Daily Inhalation dose (mg/kg/day) = daily Inhalation exposure(mg ai/day)/body weight(kg) x 100%

The MOEs were calculated using the following formulas:

Dermal MOE= Daily Dermal Dose (mg/kg/day)/Dermal NOAEL(mg/kg/day)

*Inhalation MOE= Daily Inhalation Dose (mg/kg/day)/Inhalation NOAEL(mg/kg/day***)**

Margins of exposure (MOEs) were calculated for handlers for short-term (up to 1 month) and intermediate-term (1 to 6 months) durations. The assessment includes MOE calculations for the surrogate data from seed treatment SOP. The short-term duration is believed to be most representative of on-farm seed treaters and the intermediate-term duration represents commercial seed treaters who may repeatedly apply PCNB for 1 to 6 months.

HED calculated the baseline, minimum PPE, maximum PPE MOEs for each occupational exposure scenario using the following assumptions:

All Scenarios:
All occupational handlers are wearing footwear (socks plus shoes or boots), foot exposure is not traditionally monitored, and therefore, a 100 percent protection factor is implied.

Baseline Attire:
Seed treaters using on-farm, bagging, sewing techniques and are wearing long-sleeved shirts, long pants, no gloves, and no respirator.

Minimum PPE
Seed treaters using on-farm, loading/applying techniques and are wearing long-sleeved shirts,

long pants, gloves, and no respirator.

Maximum PPE
Seed treaters loading/applying techniques and are wearing long-sleeved shirts, long pants, gloves, coveralls and no respirator.

Table 7- Summary of Exposure Data Used for PCNB Seed Treatment Risk Assessment

Exposure Scenarios	Baseline Dermal (mg/lb ai)	Baseline Inhalation (ug/lb ai)	Single Layer Dermal (mg/lb ai)	Double Layer Dermal (mg/lb ai)
Loader/Applicator (1)	ND	0.34	0.023	0.018
Bagger (2)	0.0091	0.16	ND	ND
Sewer (3)	0.0062	0.23	ND	ND
Multiple Activities (4)	ND	1.6	0.042	ND
On-Farm Planter Box Treatment (5)	13	1.2	12.6 (glove)	ND
Load and Plant Treated Seed (6)	ND	3.4	0.25	ND

The results of the seed treatment risk assessment for both the short- and intermediate-term exposure durations presented in appendix B (table B9) and are summarized in Table 8. Margins of exposure (MOEs) were calculated for seed treatment handlers and planters for short-term (up to 1 month) and intermediate-term (1 to 6 months) durations. The assessment includes MOE calculations for various feasible levels of personal protective equipment (PPE) using the surrogate data from seed treatment SOP.

The results of the short- and intermediate-term seed handler assessments indicate that for all formulations the majority of the potential exposure scenarios provide total MOE(s) greater than or equal to 100 at the clothing attire of long pants, long sleeved shirts, gloves, and no respirator while using open systems.

Table 8: Summary of Short and Intermediate-term Dermal and Inhalation Risk from Seed Treatment for PCNB (MOEs)

Crops	Loader/applicator		Bagger		Sewer		Multiple activities		On-Farm (planter box)		Planters	
	Dermal	Inh	Dermal	Inh	Dermal	Inh	Dermal	Inh	Dermal	Inh	Dermal	Inh
Barley	1000	200	2500	500	3600	350	550	50	300	9000	3600	900
Bean	3000	700	8000	1500	11000	1000	1500	150	550	20000	16000	4000
Corn	3200	700	8000	1500	12000	1100	1800	150	2100	73000	45000	11000
Cotton	2300	500	5700	1100	8400	750	1200	100	930	33000	3600	870
	NA	NA	NA	NA	NA	NA	NA	NA	3500	12000	1300	330
Oats	650	150	1700	300	2400	200	360	300	400	13000	2400	600
Pea	1500	350	4000	730	5700	500	800	75	250	9000	13000	3000
Peanut	12500	2800	31500	6000	46000	4200	6800	600	240	8400	145000	3600
Rice	900	200	2300	400	3400	300	500	50	150	5300	2000	500
Safflower	2100	470	5300	1000	7700	700	1100	100	NA	NA	57000	14000
Sorghum	4200	940	11000	2000	15000	1400	2300	200	NA	NA	430000	110000
Soybeans	1500	350	3900	700	5700	500	800	75	3300	120000	7000	1600
Sugar beet	4100	900	10000	2000	15000	1300	2000	200	7000	230000	110000	27000
Wheat	2400	600	6000	1100	9000	800	1300	120	340	12000	7000	1600

3.0 OCCUPATIONAL EXPOSURES (HANDLER and POSTAPPLICATION)

3.1 Occupational Handlers

3.1.1 Handler Exposures Scenarios

HED has determined that there are potential exposures to mixers, loaders, applicators, or other handlers during usual use-patterns associated with PCNB. Based on the use patterns and potential exposures described in Section 1.3, 103 agricultural and ornamental exposure scenarios are identified to represent the extent of PCNB uses.

The potential handler exposures to the 103 exposure scenarios are assessed in this RED chapter using the toxicological endpoints and uncertainty factors associated with the active ingredient. Therefore, the level of personal protective equipment (PPE) is determined by the assessment of the active ingredient independently from the currently required risk mitigation measures on PCNB labels. This distinction of determining risk mitigation measures based on the active ingredient instead of the label required PPE is important because of the nature of the end-use products. For example, some end-use products may require additional PPE because of the end-use product's potential for eye and/or skin irritation . Conversely, HED does not want to mandate additional PPE (e.g., heat stress issues) if it is not required based on the endpoint and uncertainty factors. There are some PPE, such as chemical-resistant aprons and/or head gear, that the HED uses as qualitative measures because there are no recognized protection factors (PF) to assess their effectiveness. The Agency's risk managers require these types of PPE as additional mitigation of risk. For example, chemical-resistant aprons are often required to protect mixer/loaders from accidental spills. .

For occupational RED chapters process, HED presents the risks separately for some scenarios and combines others. Most of the hand- held equipment such as push type granular spreaders are assessed as mixer/loader/applicators, a combined function. With these types of small operations the mixing, loading, and applying are almost always carried out by the same individual. There are data available to estimate exposure from these small area activities. For equipment such as groundboom tractors, or airblast sprayers the tasks are assessed separately for mixer/ loaders and applicators. By separating the two job functions, HED can determine the most appropriate PPE or engineering control without requiring the handler to wear PPE throughout the entire workday or engineering controls that are not needed.

3.1.2 Summary of Uncertainties

The handler exposure assessments encompass all of the major uses of PCNB throughout the country. It is difficult to assess all of the "typical" agricultural uses (i.e., actual or predominate application rates and farm sizes), and therefore, an assessment has been developed that believed to be realistic and yet provides a reasonable certainty that the exposures are not underestimated. The assumptions and uncertainties are identified below to be used in risk management decisions:

- *Application Rates:* The application rates are the maximum allowable that were identified on the available product labels.

- *Acres Treated*: The daily acres treated are HED standard values (EXPO SAC policy 9.1).

- *Unit Exposures:* The unit exposure values calculated by PHED generally range from the geometric mean to the median of the selected data set. To add consistency and quality control to the values produced from this system, the PHED Task Force has evaluated all data within the system and has developed a set of grading criteria to characterize the quality of the original study data. The assessment of data quality is based on the number of observations and the available quality control data. These evaluation criteria and the caveats specific to each exposure scenario are summarized in Appendix D, Table D1. While data from PHED provides the best available information on handler exposures, it should be noted that some aspects of the included studies (e.g., duration, acres treated, pounds of active ingredient handled) may not accurately represent labeled uses in all cases.

- *Amount Handled:* The daily acres treated are HED standard values (see Table 9). Deviations from these standard values include the airblast acreage for magnolia tree. The acreage is assessed at 20 acres because magnolia trees are grown in smaller plots.

3.1.3 Handler Risks

Table 9 presents the exposure scenarios, application rates, and amount treated (i.e., acres or gallons) that have been used in the exposure calculations. PCNB labels include a multitude of uses and a wide range of application rates. Therefore, the rates presented in Table 6 are not all inclusive and an attempt has been made to assess a range of application rates to capture exposure associated within each scenario.

PHED V1.1 has been used to assess the exposure scenarios for PCNB. PHED was designed by a Task Force of representatives from the U.S. EPA, Health Canada, the California Department of Pesticide Regulation, and member companies of the American Crop Protection Association. PHED is a software system consisting of two parts -- a database of measured exposure values for workers involved in the handling of pesticides under actual field conditions and a set of computer algorithms used to subset and statistically summarize the selected data. Currently, the database contains values for over 1,700 monitored individuals (i.e., replicates).

Users select criteria to subset the PHED database to reflect the exposure scenario being evaluated. The subsetting algorithms in PHED are based on the central assumption that the magnitude of handler exposures to pesticides are primarily a function of activity (e.g., mixing/loading, applying), formulation type (e.g., wettable powders, granulars), application

method (e.g., aerial, groundboom), and clothing scenarios (e.g., gloves, double layer clothing). Once the data for a given exposure scenario has been selected, the data are normalized (i.e., divided by) by the amount of pesticide handled resulting in standard unit exposures (milligrams of exposure per pound of active ingredient handled). Following normalization, the data are statistically summarized. The distribution of exposure values for each body part (e.g., chest, upper arm) is categorized as normal, lognormal, or "other" (i.e., neither normal nor lognormal). A central tendency value is then selected from the distribution of the exposure values for each body part. These values are the arithmetic mean for normal distributions, the geometric mean for lognormal distributions, and the median for all "other" distributions. Once selected, the central tendency values for each body part are composited into a "best fit" exposure value representing the entire body.

Table 9: Exposure Variables for Agricultural Uses (Including Non WPS Ornamental Uses) of PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals
Mixer/Loader			
Dry Flowables for High-Pressure HandWand application (1)	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.00375	1000 gals
Dry Flowables for Chemigation application (2)	Commercial/industrial lawns	32.67	10
Dry Flowables for High-Pressure HandWand application (3)	Commercial/industrial lawns, residential lawn	0.04	1000 gals
Dry Flowables for Chemigation application (4)	Golf course turf (tees/greens)	32.67	10
Dry Flowables for Chemigation application (5)	Golf course turf (fairways)	32.67	40
Dry Flowables for Chemigation application (6)	Sod farms	32.67	350
Dry Flowables for High-Pressure HandWand application (7)	Ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals
Dry Flowables for High-Pressure HandWand application (8)	Containerized nursery stock, soil drench (pepper, tomato)	0.00375	1000 gals
Dry Flowables for Groundboom application (9)	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80
Dry Flowables for Groundboom application (10)	Cotton	2	200
Dry Flowables for Groundboom application (11)	Peanuts	11.59	80
Mixing/Loading Liquids for Groundboom application (12)	Band treatment (dried beans, succulent beans, lima)	2	80
Mixing/Loading Liquids for Groundboom application (13)	Band treatment, soil treatment (garlic)	20	80
Mixing/Loading Liquids for Chemigation application (14)	Ornamental lawn and turf	32.67	5
Mixing/Loading Liquids for Chemigation application (15)	Commercial/industrial lawns	32.67	10
Mixing/Loading Liquids for Chemigation application (16)	Sod farms	32.67	350
Mixing/Loading Liquids for Groundboom application (16a)	Sod farms	32.67	80

Table 9: Exposure Variables for Agricultural Uses (Including Non WPS Ornamental Uses) of PCNB			
Exposure Scenario (Scenario #)	**Crop**	**App Rate[4] lbai/A or lb ai/gal**	**Daily Area Treated A or gals**
Mixing/Loading Liquids for Chemigation application (17)	Golf course turf	32.67	10
Mixing/Loading Liquids for Chemigation application (18)	Golf course turf (fairways)	32.67	40
Mixing/Loading Liquids for High-Pressure HandWand application (19)	Commercial industrial lawn	0.15	1000 gals
Mixing/Loading Liquids for Groundboom application (20)	Cotton	2	200
Mixing/Loading Liquids for Groundboom application (21)	Garlic	20	80
Mixing/Loading Liquids for Groundboom application (22)	Peanuts	10	80
Mixing/Loading Liquids for Groundboom application (23)	Potato	25	80
Mixing/Loading Liquids for Chemigation application (24)	Potato	25	350
Mixing/Loading Liquids for Aerial application (25)	Potato	25	350
Mixing/Loading Liquids for Groundboom application (26)	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80
Mixing/Loading Liquids for High-Pressure HandWand application (27)	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.015	1000 gals
Mixing/Loading Liquids for Airblast application (28)	Foliar spray (magnolia tree)	6	20
Mixing/Loading Liquids for Groundboom application (29)	Tomato, pepper	7.50	80
Mixing/Loading Liquids for Groundboom application (30)	Southern pine (seed orchard)	42.50	10
Mixing/Loading Liquids for Dip tank application (31)	Ornamental bulb soak and cut flowers	0.015	100 gals
Loading Granulars for Tractor-Drawn Spreaders application (32)	Beans	1.50	80
Loading Granulars for Tractor-Drawn Spreaders application (33)	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80
Loading Granulars for Tractor-Drawn Spreaders application (34)	Golf course turf (tees/greens)	43.56	10
Loading Granulars for Tractor-Drawn Spreaders application (35)	Golf course turf (fairways)	43.56	40
Loading Granulars for Tractor-Drawn Spreaders application (36)	Sod farms	43.56	80
Loading Granulars for Tractor-Drawn Spreaders application (37)	Cotton	2	200
Loading Granulars for Tractor-Drawn Spreaders application (38)	Pepper	1.35	80
Loading Granulars for Tractor-Drawn Spreaders application (39)	Potato	25	80

Table 9: Exposure Variables for Agricultural Uses (Including Non WPS Ornamental Uses) of PCNB			
Exposure Scenario (Scenario #)	**Crop**	**App Rate[4] lbai/A or lb ai/gal**	**Daily Area Treated A or gals**
Wettable Powders for Groundboom application (40)	beans(lima, snap, dried)	1.50	80
Wettable Powders for Chemigation application (41)	beans(lima, snap, dried)	1.50	350
Wettable Powders for Chemigation application (42)	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350
Wettable Powders for Groundboom application (43)	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80
Wettable Powders for Chemigation application (44)	commercial/industrial lawns	40.80	10
Wettable Powders for High-Pressure HandWand application (45)	commercial/industrial lawns	0.50	1000 gals
Wettable Powders for Groundboom application (46)	cotton	2	200
Wettable Powders for Chemigation application (47)	cotton	2	350
Wettable Powders for Chemigation application (48)	golf course turf (tees and greens)	40.80	10
Wettable Powders for Chemigation application (49)	golf course turf (fairways)	40.80	40
Wettable Powders for Chemigation application (50)	sod farms	40.80	350
Wettable Powders for Groundboom application (51)	sod farms	40.80	80
Wettable Powders for Groundboom application (52)	Peanuts	2	80
Wettable Powders for Chemigation application (53)	peanuts	2	350
Wettable Powders for Groundboom application (54)	pepper, tomato	7.50	80
Wettable Powders for Groundboom application (55)	pine (seed orchard)	37.50	10
Applicator			
Sprays for High-Pressure HandWand application (56)	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.00375	1000 gals
Sprays for High-Pressure HandWand application (57)	commercial/industrial lawns, residential lawn	0.04	1000 gals
Sprays for High-Pressure HandWand application (58)	ornamentals (foliar application only)	1.50	1000 gals
Sprays for High-Pressure HandWand application (59)	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals
Sprays for Groundboom application (60)	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80
Sprays for Groundboom application (61)	Cotton	2	200
Sprays for Groundboom application (62)	Peanuts	11.59	80
Sprays for Groundboom application (63)	Band treatment (dried beans, succulent beans, lima)	2	80

Table 9: Exposure Variables for Agricultural Uses (Including Non WPS Ornamental Uses) of PCNB			
Exposure Scenario (Scenario #)	**Crop**	**App Rate[4] lbai/A or lb ai/gal**	**Daily Area Treated A or gals**
Sprays for Groundboom application (64)	Band treatment, soil treatment (garlic)	20	80
Sprays for High-Pressure HandWand application (65)	commercial industrial lawn	0.15	1000 gals
Sprays for Groundboom application (66)	Cotton	2	200
Sprays for Groundboom application (67)	Garlic	20	80
Sprays for Groundboom application (68)	Peanuts	10	80
Sprays for Groundboom application (69)	Potato	25	80
Sprays for Aerial application (70)	potato	25	350
Sprays for Groundboom application (71)	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80
Sprays for High-Pressure HandWand application (72)	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.015	1000 gals
Sprays for Airblast application (73)	Foliar spray (magnolia tree)	6	20
Sprays for Groundboom application (74)	Tomato, pepper	7.50	80
Sprays for Groundboom application (75)	Southern pine (seed orchard)	42.50	10
Applying Granulars for Tractor-Drawn Spreaders application (76)	Beans	1.50	80
Applying Granulars for Tractor-Drawn Spreaders application (77)	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80
Applying Granulars for Tractor-Drawn Spreaders application (78)	Golf course turf (tees/greens)	43.56	10
Applying Granulars for Tractor-Drawn Spreaders application (79)	Golf course turf (fairways)	43.56	40
Applying Granulars for Tractor-Drawn Spreaders application (80)	Sod farms	43.56	80
Applying Granulars for Tractor-Drawn Spreaders application (81)	Cotton	2	200
Applying Granulars for Tractor-Drawn Spreaders application (82)	Peanuts	2	80
Applying Granulars for Tractor-Drawn Spreaders application (83)	Pepper	1.35	80
Applying Granulars for Tractor-Drawn Spreaders application (84)	Potato	25	80
Sprays for Groundboom application (85)	Beans(lima, snap, dried)	1.50	80

Table 9: Exposure Variables for Agricultural Uses (Including Non WPS Ornamental Uses) of PCNB			
Exposure Scenario (Scenario #)	**Crop**	**App Rate[4] lbai/A or lb ai/gal**	**Daily Area Treated A or gals**
Sprays for Groundboom application (86)	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80
Sprays for High-Pressure HandWand application (87)	commercial/industrial lawns	0.50	1000 gals
Sprays for Groundboom application (88)	Cotton	2	200
Sprays for Groundboom application (89)	Sod farms	40.80	80
Sprays for Groundboom application (89a)	Sod farms	32.67	80
Sprays for Groundboom application (90)	Peanuts	2	80
Sprays for Groundboom application (91)	Pepper, tomato	7.50	80
Sprays for Groundboom application (92)	Pine (seed orchard)	37.50	10
Flagger			
Flagging for Sprays application (93)	Potato	25	350
Mixer/Loader/App			
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	Ornamentals (herbaceous plants, woody shrubs and vines)	218	5
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	Ornamental and Lawn turf	32.67	5
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	Commercial industrial lawns	43.56	5
Loading/Applying Granulars for Belly Grinder application (97)	ornamental lawns and turf	43.56	0.5
Loading/Applying Granulars for Belly Grinder application (98)	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	Ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	ornamental (shade trees)	37.50	5

Calculations of Exposure

Potential daily dermal exposure is calculated using the following formula:

Daily Dermal Exposure (mg ai/day) =

Dermal Unit Exposure (mg ai/lb ai) x Application Rate (lb ai/A or gal) x Daily Acres or gallons Treated (A or gal/day)

Potential daily inhalation exposure is calculated using the following formula:

Daily Inhalation Exposure (mg ai/day) =

Inhalation Unit Exposure (mg ai/lb ai) x Application Rate (lb ai/A or gal) x Daily Acres or gallons Treated (A or gal/day)

Calculation Of Risk

Using the daily dermal exposure scenarios identified in the exposure section, HED calculated the potential risk to persons from handler exposures.

The inhalation and dermal daily doses were calculated using the following formulas:

Daily dermal dose (mg/kg/day) = daily dermal exposure(mg ai/day)/body weight(kg) x dermal absorption factor(100%)

Daily Inhalation dose (mg/kg/day) = daily Inhalation exposure(mg ai/day)/body weight(kg) x 100%

The MOEs were calculated using the following formulas:

Dermal MOE= Daily Dermal Dose (mg/kg/day)/Dermal NOAEL(mg/kg/day)

Inhalation MOE= Daily Inhalation Dose (mg/kg/day)/Inhalation NOAEL(mg/kg/day)

3.1.4 Risks Summary

Margins of exposure (MOEs) were calculated for handlers for short-term (up to 1 month) and intermediate-term (1 to 6 months) durations. The assessment includes MOE calculations for various levels of personal protective equipment (PPE) using the surrogate data from PHED. The short-term duration is believed to be most representative of private growers and the intermediate-term duration represents commercial applicators who may repeatedly apply PCNB for 1 to 6 months.

HED calculated the baseline, minimum PPE (labeled PPE1, PPE2, PPE3), maximum PPE (labeled PPE4, PPE5, PPE6), and engineering control MOEs for each occupational exposure scenario using the following assumptions:

All Scenarios:
All occupational handlers are wearing footwear (socks plus shoes or boots), foot exposure is not traditionally monitored, and therefore, a 100 percent protection factor is implied.

Baseline Attire:
Occupational handlers using open mixing techniques and open cab tractors are wearing long-sleeved shirts, long pants, no gloves, and no respirator.

Minimum PPE (PPE1) Attire:
Occupational handlers using open mixing techniques and open cab tractors are wearing long-sleeved shirts, long pants, chemical resistant gloves, and a no respirator.

Minimum PPE (PPE2) Attire:
Occupational handlers using open mixing techniques and open cab tractors are wearing long-sleeved shirts, long pants, chemical resistant gloves, and a dust/mist (5 fold PF) respirator.

Minimum PPE (PPE3) Attire:
Occupational handlers using open mixing techniques and open cab tractors are wearing long-sleeved shirts, long pants, chemical resistant gloves, and an air purifying (10 fold PF) respirator.

Maximum PPE (PPE4) Attire:
Occupational handlers using open mixing techniques and open cab tractors are wearing coveralls over long-sleeved shirts, long pants, chemical resistant gloves, and no respirator.

Maximum PPE (PPE5) Attire:
Occupational handlers using open mixing techniques and open cab tractors are wearing coveralls over long-sleeved shirts, long pants, chemical resistant gloves, and a PF 5 (5 fold PF) respirator.

Maximum PPE (PPE6) Attire:
Occupational handlers using open mixing techniques and open cab tractors are wearing coveralls over long-sleeved shirts, long pants, chemical resistant gloves, and an PF 10 (10 fold PF) respirator.

Engineering Controls:
Occupational handlers using closed mixing techniques and enclosed cab tractors or cockpits while wearing long-sleeved shirts, long pants, chemical resistant gloves, and no respiratory protection.

The results of the dermal handler risk assessment for both the short- and intermediate-term exposure durations are summarized in Table 10.

The risk calculations for dermal short- and intermediate-term exposure risk calculations resulted largely in MOEs greater than or equal to 100, with use of PPE or engineering controls. The following scenarios did not have MOEs greater than or equal to 100 at any mitigation level:

The agricultural results of the short- and intermediate-term occupational handler assessments indicate that for the ***dry flowable formulation*** the majority of the potential exposure scenarios provide total MOE(s) greater than or equal to 100 at the baseline clothing attire of long pants, long sleeved shirts, no gloves, and no respirator while using open systems. For the ***liquid formulation***, the risks indicate that in order for the mixer/loaders to achieve MOEs of 100 for all uses at both the short- and intermediate-term exposure durations that minimum PPE clothing attire be required (i.e., long pants, long sleeved shirts, chemical resistant gloves, and a dust/mist

respirator while using open systems). For the ***wettable powder formulation*** risks indicate that in order for the mixer/loaders to achieve MOEs of 100 for all uses at both the short- and intermediate-term durations that some uses should be packaged in water soluble packets (clothing attire of long pants, long sleeved shirts, chemical resistant gloves, and no respirator). The risk for the majority of uses with wettable powder is acceptable.
Dust formulation was only used for seed treatment and have acceptable risk.

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Mixer/Loader											
Dry Flowables for High-Pressure HandWand application (1)	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	85000	85000	120000	No Data	24000	120000	240000	No Data
Dry Flowables for Chemigation application (2)	Commercial/ industrial lawns	32.67	10	970	970	1400	No Data	280	1400	2800	No Data
Dry Flowables for High-Pressure HandWand application (3)	Commercial/ industrial lawns, residential lawn	0.04	1000 gals	8500	8500	12000	No Data	2400	12000	24000	No Data
Dry Flowables for Chemigation application (4)	Golf course turf (tees/greens)	32.67	10	970	970	1400	No Data	280	1400	2800	No Data
Dry Flowables for Chemigation application (5)	Golf course turf (fairways)	32.67	40	240	240	340	No Data	70	360	700	No Data
Dry Flowables for Chemigation application (6)	Sod farms	32.67	350	28	28	39	No Data	8	41	80	No Data
Dry Flowables for High-Pressure HandWand application (7)	Ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	210	210	300	No Data	61	310	610	No Data
Dry Flowables for High-Pressure HandWand application (8)	Containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	85000	85000	120000	No Data	24000	120000	240000	No Data

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Dry Flowables for Groundboom application (9)	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	130	130	190	No Data	38	190	380	No Data
Dry Flowables for Groundboom application (10)	Cotton	2	200	800	800	1100	No Data	230	1200	2300	No Data
Dry Flowables for Groundboom application (11)	Peanuts	11.59	80	340	340	480	No Data	98	500	980	No Data
Mixing/Loading Liquids for Groundboom application (12)	Band treatment (dried beans, succulent beans, lima)	2	80	45	5700	7700	15000	360	1800	3600	5300
Mixing/Loading Liquids for Groundboom application (13)	Band treatment, soil treatment (garlic)	20	80	4.5	570	770	1500	36	180	360	530
Mixing/Loading Liquids for Chemigation application (14)	Ornamental lawn and turf	32.67	5	44	5600	7600	15000	360	1800	3600	5200
Mixing/Loading Liquids for Chemigation application (15)	Commercial/industrial lawns	32.67	10	22	2800	3800	7500	180	890	1800	2600
Mixing/Loading Liquids for Chemigation application (16)	Sod farms	32.67	350	0.63	80	110	210	5.1	26	51	74
Mixing/Loading Liquids for Grounfboom application (16a)	Sod farms	32.67	80	2.8	350	470	930	22	110	220	320
Mixing/Loading Liquids for Chemigation application (17)	Golf course turf	32.67	10	22	2800	3800	7500	180	890	1800	2600

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB											
Exposure Scenario (Scenario #)	**Crop**	**App Rate[4] lbai/A or lb ai/gal**	**Daily Area Treated A or gals**	**Dermal MOE**				**Inhalation MOE[9]**			
				Baseline	**PPE1 PPE2 PPE3**	**PPE4 PPE5 PPE6**	**Eng.C**	**Baseline PPE1 PPE4**	**PPE2 PPE5**	**PPE3 PPE6**	**Eng.C**
Mixing/Loading Liquids for Chemigation application (18)	Golf course turf (fairways)	32.67	40	5.5	700	950	1900	45	220	450	650
Mixing/Loading Liquids for High-Pressure HandWand application (19)	Commercial industrial lawn	0.15	1000 gals	48	6100	8200	16000	390	1900	3900	5600
Mixing/Loading Liquids for Groundboom application (20)	Cotton	2	200	18	2300	3100	6100	150	730	1500	2100
Mixing/Loading Liquids for Groundboom application (21)	Garlic	20	80	4.5	570	770	1500	36	180	360	530
Mixing/Loading Liquids for Groundboom application (22)	Peanuts	10	80	9.1	1100	1500	3100	73	360	730	1100
Mixing/Loading Liquids for Groundboom application (23)	Potato	25	80	3.6	460	620	1200	29	150	290	420
Mixing/Loading Liquids for Chemigation application (24)	Potato	25	350	0.83	100	140	280	6.7	33	67	96
Mixing/Loading Liquids for Aerial application (25)	Potato	25	350	0.83	100	140	280	6.7	33	67	96
Mixing/Loading Liquids for Groundboom application (26)	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	3	380	510	1000	24	120	240	350

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Mixing/Loading Liquids for High-Pressure HandWand application (27)	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	480	6100	82000	160000	3900	19000	39000	56000
Mixing/Loading Liquids for Airblast application (28)	Foliar spray (magnolia tree)	6	20	60	7600	10000	20000	490	2400	4900	7000
Mixing/Loading Liquids for Groundboom application (29)	Tomato, pepper	7.50	80	12	1500	2100	4100	97	490	970	1400
Mixing/Loading Liquids for Groundboom application (30)	Southern pine (seed orchard)	42.50	10	17	2100	2900	5700	140	690	1400	2000
Mixing/Loading Liquids for Dip tank application (31)	Ornamental bulb soak and cut flowers	0.02	100 gals	4800	610000	820000	1600000	39000	190000	390000	560000
Loading Granulars for Tractor-Drawn Spreaders application (32)	Beans	1.50	80	21000	25000	51000	1000000	340	1700	3400	17000
Loading Granulars for Tractor-Drawn Spreaders application (33)	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	1000	1300	2600	51000	17	86	170	860
Loading Granulars for Tractor-Drawn Spreaders application (34)	Golf course turf (tees/greens)	43.56	10	5700	7000	14000	280000	95	470	950	4700

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Loading Granulars for Tractor-Drawn Spreaders application (35)	Golf course turf (fairways)	43.56	40	1400	1700	3500	71000	24	120	240	1200
Loading Granulars for Tractor-Drawn Spreaders application (36)	Sod farms	43.56	80	720	870	1800	35000	12	59	120	590
Loading Granulars for Tractor-Drawn Spreaders application (37)	Cotton	2	200	6300	7600	15000	310000	100	510	1000	5100
Loading Granulars for Tractor-Drawn Spreaders application (38)	Pepper	1.35	80	23000	28000	57000	1100000	380	1900	3800	19000
Loading Granulars for Tractor-Drawn Spreaders application (39)	Potato	25	80	1300	1500	3100	62000	21	100	210	1000
Wettable Powders for Groundboom application (40)	beans(lima, snap, dried)	1.50	80	47	1000	1300	18000	14	68	140	2400
Wettable Powders for Chemigation application (41)	beans(lima, snap, dried)	1.50	350	11	240	310	4100	3.1	16	31	560
Wettable Powders for Chemigation application (42)	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	0.54	12	15	200	0.16	0.78	1.6	28

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB											
Exposure Scenario (Scenario #)	**Crop**	**App Rate[4] lbai/A or lb ai/gal**	**Daily Area Treated A or gals**	**Dermal MOE**				**Inhalation MOE[9]**			
				Baseline	**PPE1 PPE2 PPE3**	**PPE4 PPE5 PPE6**	**Eng.C**	**Baseline PPE1 PPE4**	**PPE2 PPE5**	**PPE3 PPE6**	**Eng.C**
Wettable Powders for Groundboom application (43)	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	2.4	51	67	890	0.68	3.4	6.8	120
Wettable Powders for Chemigation application (44)	commercial/industrial lawns	40.80	10	14	300	400	5300	4	20	40	710
Wettable Powders for High-Pressure HandWand application (45)	commercial/industrial lawns	0.50	1000 gals	11	250	320	4300	3.3	16	33	580
Wettable Powders for Groundboom application (46)	cotton	2	200	14	310	400	5400	4.1	20	41	730
Wettable Powders for Chemigation application (47)	cotton	2	350	8.1	180	230	3100	2.3	12	23	420
Wettable Powders for Chemigation application (48)	golf course turf (tees and greens)	40.80	10	14	300	400	5300	4	20	40	710
Wettable Powders for Chemigation application (49)	golf course turf (fairways)	40.80	40	3.5	76	99	1300	0.100	5	1.00	180
Wettable Powders for Chemigation application (50)	sod farms	40.80	350	0.4	8.7	11	150	0.11	0.57	1.1	20
Wettable Powders for Groundboom application (51)	sod farms	40.80	80	1.7	38	49	660	0.50	2.5	5	89

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Wettable Powders for Groundboom application (52)	Peanuts	2	80	35	770	1000	13000	10	51	100	1800
Wettable Powders for Chemigation application (53)	peanuts	2	350	8.1	180	230	3100	2.3	12	23	420
Wettable Powders for Groundboom application (54)	pepper, tomato	7.50	80	9.5	210	270	3600	2.7	14	27	490
Wettable Powders for Groundboom application (55)	pine (seed orchard)	37.50	10	15	330	430	5700	4.3	22	43	780
Applicator											
Sprays for High-Pressure HandWand application (56)	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	3100	8800	16000	No Data	240	1200	2400	No Data
Sprays for High-Pressure HandWand application (57)	commercial/industrial lawns, residential lawn	0.04	1000 gals	310	880	1600	No Data	24	120	240	No Data
Sprays for High-Pressure HandWand application (58)	ornamentals (foliar application only)	1.50	1000 gals	7.8	22	39	No Data	0.59	2.9	5.9	No Data
Sprays for High-Pressure HandWand application (59)	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	3100	8800	16000	No Data	240	1200	2400	No Data
Sprays for Groundboom application (60)	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	630	630	800	1800	39	190	390	680

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Sprays for Groundboom application (61)	Cotton	2	200	3800	3800	4800	11000	240	1200	2400	4100
Sprays for Groundboom application (62)	Peanuts	11.59	80	1600	1600	2100	4500	100	500	1000	1800
Sprays for Groundboom application (63)	Band treatment (dried beans, succulent beans, lima)	2	80	9400	9400	12000	26000	590	2900	5900	10000
Sprays for Groundboom application (64)	Band treatment, soil treatment (garlic)	20	80	940	940	1200	2600	59	290	590	1000
Sprays for High-Pressure HandWand application (65)	commercial industrial lawn	0.15	1000 gals	78	220	390	No Data	5.9	29	59	No Data
Sprays for Groundboom application (66)	Cotton	2	200	3800	3800	4800	11000	240	1200	2400	4100
Sprays for Groundboom application (67)	Garlic	20	80	940	940	1200	2600	59	290	590	1000
Sprays for Groundboom application (68)	Peanuts	10	80	1900	1900	2400	5300	120	580	1200	2000
Sprays for Groundboom application (69)	Potato	25	80	750	750	950	2100	47	230	470	810
Sprays for Aerial application (70)	potato	25	350	No Data	No Data	No Data	480	No Data	No Data	No Data	120

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB											
Exposure Scenario (Scenario #)	**Crop**	**App Rate[4] lbai/A or lb ai/gal**	**Daily Area Treated A or gals**	**Dermal MOE**				**Inhalation MOE[9]**			
				Baseline	**PPE1 PPE2 PPE3**	**PPE4 PPE5 PPE6**	**Eng.C**	**Baseline PPE1 PPE4**	**PPE2 PPE5**	**PPE3 PPE6**	**Eng.C**
Sprays for Groundboom application (71)	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	630	630	800	1800	39	190	390	680
Sprays for High-Pressure HandWand application (72)	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	780	2200	3900	No Data	59	290	590	No Data
Sprays for Airblast application (73)	Foliar spray (magnolia tree)	6	20	490	730	800	9200	130	650	1300	1300
Sprays for Groundboom application (74)	Tomato, pepper	7.50	80	2500	2500	3200	7000	160	780	1600	2700
Sprays for Groundboom application (75)	Southern pine (seed orchard)	42.50	10	3500	3500	4500	9900	220	1100	2200	3800
Applying Granulars for Tractor-Drawn Spreaders application (76)	Beans	1.50	80	18000	24000	42000	83000	490	2400	4900	2700
Applying Granulars for Tractor-Drawn Spreaders application (77)	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	880	1200	2100	4200	24	120	240	130

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Applying Granulars for Tractor-Drawn Spreaders application (78)	Golf course turf (tees/greens)	43.56	10	4900	6700	11000	23000	130	670	1300	730
Applying Granulars for Tractor-Drawn Spreaders application (79)	Golf course turf (fairways)	43.56	40	1200	1700	2900	5700	33	170	330	180
Applying Granulars for Tractor-Drawn Spreaders application (80)	Sod farms	43.56	80	610	840	1400	2900	17	84	170	91
Applying Granulars for Tractor-Drawn Spreaders application (81)	Cotton	2	200	5300	7300	13000	25000	150	730	1500	800
Applying Granulars for Tractor-Drawn Spreaders application (82)	Peanuts	2	80	13000	18000	31000	63000	360	1800	3600	2000
Applying Granulars for Tractor-Drawn Spreaders application (83)	Pepper	1.35	80	20000	27000	46000	93000	540	2700	5400	2900
Applying Granulars for Tractor-Drawn Spreaders application (84)	Potato	25	80	1100	1500	2500	5000	29	150	290	160
Sprays for Groundboom application (85)	Beans(lima, snap, dried)	1.50	80	13000	13000	16000	35000	790	3900	7900	14000

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Sprays for Groundboom application (86)	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	630	630	800	1800	39	190	390	680
Sprays for High-Pressure HandWand application (87)	commercial/industrial lawns	0.50	1000 gals	23	66	120	No Data	1.8	8.8	18	No Data
Sprays for Groundboom application (88)	Cotton	2	200	3800	3800	4800	11000	240	1200	2400	4100
Sprays for Groundboom application (89)	Sod farms	40.80	80	460	460	580	1300	29	140	290	500
Sprays for Groundboom application (89a)	Sod farms	32.67	80	570	570	730	1600	36	180	360	620
Sprays for Groundboom application (90)	Peanuts	2	80	9400	9400	12000	26000	590	2900	5900	10000
Sprays for Groundboom application (91)	Pepper, tomato	7.50	80	2500	2500	3200	7000	160	780	1600	2700
Sprays for Groundboom application (92)	Pine (seed orchard)	37.50	10	4000	4000	5100	11000	250	1200	2500	4300
Flagger											
Flagging for Sprays application (93)	Potato	25	350	220	240	240	11000	23	110	230	1100
Mixer/Loader/App											

Table 10; Summary of Short and Intermediate-Term Occupational Risk for PCNB

Exposure Scenario (Scenario #)	Crop	App Rate[4] lbai/A or lb ai/gal	Daily Area Treated A or gals	Dermal MOE				Inhalation MOE[9]			
				Baseline	PPE1 PPE2 PPE3	PPE4 PPE5 PPE6	Eng.C	Baseline PPE1 PPE4	PPE2 PPE5	PPE3 PPE6	Eng.C
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	Ornamentals (herbaceous plants, woody shrubs and vines)	218	5	No Data	No Data	77	No Data	36	No Data	No Data	No Data
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	Ornamental andLawn turf	32.67	5	No Data	No Data	510	No Data	240	No Data	No Data	No Data
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	Commercial industrial lawns	43.56	5	280	440	880	No Data	44	No Data	No Data	No Data
Loading/Applying Granulars for Belly Grinder application (97)	ornamental lawns and turf	43.56	0.5	96	100	No Data	No Data	52	270	520	No Data
Loading/Applying Granulars for Belly Grinder application (98)	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	19	21	No Data	No Data	10	54	100	No Data
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	Ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	550	880	1800	No Data	88	No Data	No Data	No Data
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5	2.2	2.2	3.1	No Data	0.058	0.29	0.58	No Data
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	ornamental (shade trees)	37.50	5	13	13	18	No Data	0.34	1.7	3.4	No Data

Baseline : Occupational handlers using open mixing techniques and open cab tractors are wearing long-sleeved shirts, long pants, no gloves, and no respirator.
PPE1: Occupational handlers using open mixing techniques and open cab tractors are wearing long-sleeved shirts, long pants, chemical resistant gloves, and a no respirator.
PPE2: Occupational handlers using open mixing techniques and open cab tractors are wearing long-sleeved shirts, long pants, chemical resistant gloves, and a dust/mist (5 fold PF) respirator.
PPE3: Occupational handlers using open mixing techniques and open cab tractors are wearing long-sleeved shirts, long pants, chemical resistant gloves, and an air purifying (10 fold PF) respirator.
PPE4: Occupational handlers using open mixing techniques and open cab tractors are wearing coveralls over long-sleeved shirts, long pants, chemical resistant gloves, and no respirator.
PPE5: Occupational handlers using open mixing techniques and open cab tractors are wearing coveralls over long-sleeved shirts, long pants, chemical resistant gloves, and a dust/mist (5 fold PF) respirator.
PPE6: Occupational handlers using open mixing techniques and open cab tractors are wearing coveralls over long-sleeved shirts, long pants, chemical resistant gloves, and an air purifying (10 fold PF) respirator.
Engineering Controls: Occupational handlers using closed mixing techniques and enclosed cab tractors or cockpits while wearing long-sleeved shirts, long pants, chemical resistant gloves, and no respiratory protection.

3.2 Postapplication Exposure

Chemical specific post-application exposure data have not been submitted by the registrant in support of reregistration of PCNB. There is a low potential for occupational post-application exposure when a pre-plant or at planting fungicide is used. PCNB is applied to the soil directly and is soil incorporated well before the plants are mature. Further, the timing of the application greatly reduces the potential for post application exposure to treated foliage and/or soil. Also, many agricultural operations mechanically plant seeds early in the season, which minimizes the potential for contact. Significant exposure during harvesting or any other late season activities, is not likely since the chemical is applied pre- plant. Therefore, HED does not require a post application assessment for seed treatment or agricultural uses. However the Agency has determined that there are potential postapplication exposures to individuals re-entering PCNB treated areas for the purpose of:

Roadsides: mowing;
Bermuda grass rights-of-way: mowing;
Sod farms: mowing and harvesting;
Golf-course turfgrass: mowing;

3.2.1 Submitted Studies

Data Source and Assumptions for Scenario Considered

MRID 446871-01. Dissipation of transferable turf residues (TTR) of TURFCIDE ® 400 (40.2 percent PCNB) were quantified using the Modified California Roller technique for

collecting residues. A cotton sheet and a plastic sheet are attached to a sampling frame, and placed on the turf test area, cotton side down; then a weighted, foam-covered roller is rolled over the sheet five times, the sheet is collected and analyzed for residues. The study called for two turf applications of 12 oz product (0.75 lb a.i.) per 1000 ft^2 to be made on different varieties of grass in California (CA), Oregon (OR), and Missouri (MO) using ground application equipment. Two applications were made 3 weeks apart at all sites.

Field fortification recoveries averaged over 92% at CA, 92% at OR, and 78 % at MO sites. Most EPA Series 875 Study Guidelines were met by the studies. There was a wide range of variance in daily field data at each site, from as little as 5.94% to 29%, although most were less than 30%. There are no strict guidelines for acceptability of field variance, but high levels decrease confidence in the data.

The data were adjusted for field recoveries below the 90% guideline criterion. The data were then analyzed by HED, using semi-log regression of the PCNB residues for each site separately. The predicted initial TTR for the CA site was 0.53 $\mu g/cm^2$ ($R^2 = 0.95$) with a half-life of 1.7 days. The predicted half-life for the OR site was 2.0 days, with an initial residue of 0.22 $\mu g/cm^2$ ($R^2 = 0.78$). The predicted half-life for the MO site was 1.7 days, with an initial residue of 0.59 $\mu g/cm^2$ ($R^2 = 0.86$). The analysis shows an initial deposition of about 0.13% of the active ingredient applied.

3.2.2 Exposure and Risk Calculations

Short- and intermediate-term daily absorbed doses and MOEs were calculated as follows:

Daily Dose (mg/kg/day) = TTR (µg/cm^2) x TC (cm^2/hr) x conversion factor (1 mg/1,000 µg) x exposure time (8hrs/day)x dermal absorption (100 %) / body weight (70 kg; adult).

Where:

TTR	=	Turf Transferable Residue at time (t) where the longest duration (t) is dictated by the kinetics observed in the TTR study
Tc	=	transfer coefficient;
CF	=	conversion factor (i.e., 1 mg/1,000 µg)
Abs	=	dermal absorption (100%)
ED	=	exposure duration; 8 hours worked per day
BW	=	body weight (70 kg)

Dermal MOEs were calculated as follows: NOAEL (300 mg/kg/day; based on an dermal study) / dermal dose

For golf course maintenance or sod harvesting, transfer coefficients of 3400 and 6800 cm^2/hr were used, based on the ARTF data (see HED Exposure SAC Policy guidance 3.1, 8/00). The risk for these activities is presented in Table 11.

Table 11: Days After Treatment Target MOE Achieved (Target MOE = 100)						
Crop/Use Pattern	**Application Rate (lb ai/acre)**	**Postapplication Activity**	**TTR (sites) µg/cm² DAT 0[a]**	**Transfer Coefficient[b]**	**MOE[c]**	**REI (days)**
Golf Course Turf	**32.67**	**Mow, seed, mechanical weed, aerate, fertilize, prune**	**0.366**	**3400**	**2100**	**0**
	43.56		**0.488**		**1580**	**0**
Sod Farms	**32.67**	**Mow, scout, mechanical weed, irrigate**	**0.366**	**6800**	**1120**	**0**
	43.56		**0.488**		**790**	**0**

a TTR source: MRID # 446871-01 turf transferable residue study. DAT 0 residue values were used for the short-term assessments and DAT 7 residue values were used for the intermediate-term assessments. The study was conducted in CA, OR, MO using an average application rate of 32.67lb ai/acre for each sites. When assessing activities involving a different application rate than was used in the study, the TTR values were adjusted proportionately to reflect the different application rates. For example for an application rate of 43.56 lb ai/acre : normalized (adjusted) TTR = Turf study TTR x 43.56 lb ai/A assessed rate / 32.67 lb ai/A study rate.

b Transfer coefficient from : Policy Memo # 003 .1 "Agricultural Transfer Coefficients," Revised - August 7, 2000.

c MOE = NOAEL (300 mg/kg/day; based on a dermal study) / dermal dose

Note: TTR = turf transferable residue

DAT = days after treatment

The short- and intermediate-term risks to golf course workers or sod growers doing hand harvesting on day zero does not exceed level of concern at the rate of 32.67 and 43.56 lb ai/A.

4.0 Residential and Other Non-Occupational Exposures and Risks

There is a potential for exposure in residential settings during the application process for homeowners who use products containing PCNB. There is also a potential for exposure from entering areas treated with PCNB, such as entering treated lawn that could lead to exposures for adults and children. As a result, risk assessments have been completed for both residential handler and postapplication scenarios.

4.1 Residential Handler Exposures and Risks

The Agency uses the term "handlers" to describe those individuals who are involved in the pesticide application process. Residential handlers are addressed somewhat differently by the Agency as homeowners are assumed to complete all elements of an application with little use of any protective equipment.

4.1.1 Residential Handler Exposure Scenarios, Data and Assumptions

Much of the process for residential uses is identical to that considered for the occupational assessment with a few notable exceptions that include:

- Residential handler exposure scenarios are only considered to be short-term in nature due to the episodic uses associated with homeowner products;

- Homeowner handler assessments are completed based on individuals wearing shorts and short-sleeved shirts;

- Homeowner handlers are expected to complete all tasks associated with the use of a pesticide product including mixing/loading if needed as well as the application;

- Label use rates and use information specific to residential products serve as the basis for the risk calculations as opposed to the rates used in the occupational assessment; and

- Area/volumes of spray or chemical used in the risk assessment are based on HED guidance specific to residential use patterns.

Exposure to pesticide handlers is likely during the residential use of PCNB in a variety of environments including on turf. The anticipated use patterns and current labeling indicate several major residential exposure scenarios based on the types of equipment and techniques that can potentially be used to make PCNB applications. The quantitative exposure/risk assessment developed for residential handlers is based on these scenarios.

1. Applying Granulars for Hand application
2. Mixing/Loading/Applying Liquids for Low Pressure Handwand application
3. Mixing/Loading/Applying Liquids for Backpack sprayer application
4. Mixing/Loading/Applying Liquids for Garden hose-end sprayer(ORETF - RTU) application
5. Mixing/Loading/Applying Liquids for Garden hose-end sprayer(ORETF - conventional) application
6. Loading/Applying Granulars for Belly Grinder application
7. Loading/Applying Granulars for Push-type spreader (ORETF) application
8. Loading/Applying Granulars for Push-type spreader (ORETF) application

Data and Assumptions For Handler Exposure Scenarios

A series of assumptions and exposure factors served as the basis for completing the residential handler risk assessments. Each assumption and factor is detailed below. In addition to these factors, unit exposure values were used to calculate risk estimates. These unit exposure values were taken from the Pesticide Handlers Exposure Database (PHED) or from Outdoor Residential Exposure Task Force (ORETF) data.

The assumptions and factors used in the risk calculations include:

- Exposure factors used to calculate daily exposures to handlers were based on applicable data if available. For lack of appropriate data, values from a scenario deemed similar enough by the assessor might be used.

- The Agency always considers the maximum application rates allowed by labels in its risk assessments to consider what is legally possible based on the label.

- Residential risk assessments were not based on what could be applied in a typical workday like with the occupational risk assessments presented above. Instead,

the HED based calculations on what would reasonably be treated by homeowners such as the size of a lawn, or the size of a garden. This information was used by the HED to define chemical use values for handlers which in turn were coupled with unit exposure values to calculate risks. The factors used for the PCNB assessment were those presented in the Health Effects Division Science Advisory Committee *Policy 12: Recommended Revisions To The Standard Operating Procedures For Residential Exposure Assessment* which was completed on February 22, 2001. The following daily volumes handled and area treated, excerpted from the policy and used in each residential scenario, include:

- Low pressure handwand 5 gals;
- Backpack sprayer application 0.5 and 5 gals;
- Garden hose-end sprayer 0.5acre;
- Belly Grinder application 0.5 acre;
- Push-type spreader 0.5 acre;
- Hand application 0.023 acre.

4.1.2 Residential Handler Exposure and Risk Estimates

The residential handler exposure and risk calculations are presented in this section. Risks were calculated using the Margin of Exposure (MOE). The major difference with residential risk assessments is that the uncertainty factor which defines the level of risk concern also has the additional FQPA safety factor applied. In the case of PCNB, the overall uncertainty factor applied to residential handler risk assessments is 1000.

In residential settings, the Agency does not use personal protective equipment to limit exposures, because they are viewed as impractical and not enforceable. Risk estimates are based on handlers wearing short-sleeve shirts, short pants, shoes, and socks. Residential risks are of concern for a few scenarios, (i.e., MOE < 1000) for non cancer risk assessments in non occupational settings. The scenarios where MOEs do not meet the Agency's target MOE uncertainty factor for non cancer risk assessments include dermal risk for mixing/loading/applying liquid with low pressure handwand and dermal and inhalation risk for garden hose-end sprayer and belly grinder.

The residential handler scenarios that are **not** of concern (i.e., MOE ≥ 1000) for short- and intermediate-term dermal and inhalation risks are backpack sprayer application and push type spreader.

4.1.3 Summary of Risk for Residential Handlers

The non cancer risk calculations for residential PCNB handlers are included in Appendix B (Table B10) and summarized below in Table 12.

Table 12: Summary Short Term Residential handler Risk for PCNB					
Exposure Scenario (Scenario #)	**Crop[3]**	**Application Rate**	**Daily Area Treated/day**	**Dermal MOE[7]**	**Inhalation MOE**
Applicator					
Applying Granulars for Hand application (1)	Turf	32.67 lb ai /A	0.023 A	65	200
Mixer/Loader/App					
Mixing/Loading/Applying Liquids for Low Pressure Handwand application (2)	Turf	0.15 lb ai /gal	5 gal	280	3100
Mixing/Loading/Applying Liquids for Backpack sprayer application (3)		0.15 lb ai /gal	5 gal	5500	3100
Mixing/Loading/Applying Liquids for Garden hose-end sprayer(ORETF application (4)		32.67 lb ai /A	0.5 A	490	390
Mixing/Loading/Applying Liquids for Garden hose-end sprayer(ORETF - conventional) application (5)		32.67 lb ai /A	0.5 A	120	250
Loading/Applying Granulars for Belly Grinder application (6)		32.67 lb ai /A	0.5 A	12	69
Loading/Applying Granulars for Push-type spreader (ORETF) application (7)		32.67 lb ai /A	0.5 A	1900	4900
Loading/Applying Granulars for Push-type spreader (ORETF) application (8)		43.56 lb ai /A	0.5 A	1400	3700

4.2 NON-OCCUPATIONAL POST-APPLICATION EXPOSURE AND RISK ESTIMATES

4.2.1 Post-Application Exposure Scenarios, Data, and Assumptions

Adults and children, are potentially exposed to residues after application of PCNB products in residential settings. After application to turf, short- to intermediate-term dermal exposures are anticipated for adults and children. Incidental oral exposure is also expected to occur for small children and is combined with their dermal exposures, where applicable (i.e., playing on turf). The physical and behavioral differences between adults and children are continuously being studied by the Agency, and the current standard assumptions set forth by the HED and the Science Advisory Panel (SAP) are contained in the Residential SOPs. The SOPs were updated in February, 2001.

HED always completes short- and intermediate-term risk assessments using maximum application rates for each scenario because what is possible under the label must be evaluated for complete stewardship in order to ensure HED has no concern for the specific use.

The scenarios likely to result in postapplication exposures are presented below. Because the label prohibits application more than 2 times per year, and even with the slow dissipation rates, it is not expected that individual residential exposure duration would exceed 30 days in duration. Exposure on a residential lawn would diminish continuously with time, while

exposure through recreation turf contact would be more like random intermittent events of varying doses, all less than the dose predicted in this assessment. Residential postapplication exposure assessments assumed residents wear the following attire: short sleeved shirt, short pants, shoes and socks, and no gloves or respirator. As stated in the occupational postapplication risk section of this document, negligible PCNB inhalation exposure is anticipated for non-handlers, due to low chemical vapor pressure and dilution of vapor outdoors. The scenarios likely to result in postapplication exposures are as follows:

- dermal postapplication risks to adults and toddlers when entering PCNB treated turf and lawns;

- oral postapplication risks to toddlers from "hand-to-mouth" (i.e., ingestion of grass, soil, or hand-to-mouth contact) exposure when reentering lawns treated with granular liquid and wettable powder formulations.

Representative turf reentry activities include, but are not limited to:

(1) Adults involved in a low exposure activity, such as golfing or walking on treated turf.
(2) Toddlers involved in a low exposure activity, such as walking on treated turf.
(3) Adults mowing or other moderate contact activity, for 1-2 hours.
(4) Adults involved in a high exposure activity, such as heavy yard work (doses similar to occupational scenarios for cutting and harvesting sod)**.**
(5) Toddlers involved in high exposure activities on turf.

Although a Turf Transferable Residue (TTR) study (MRID# 44687101) was submitted in support of the reregistration of PCNB but, it was found to be not acceptable for this assessment. The TTR study was reviewed and found to have TTR transfer efficiencies of less than1% (transfer efficiency = % of the application rate). TTR data generated by ORETF members rely on a modified version of the California roller (ORETF roller) that appears to have a much lower transfer efficiency (percent of application rate) than the original version. Many TTR data submitted by ORETF members show percent transferabilities of less than 1% of the application rate for sprayable formulations and less than 0.5% of the application rate for granular formulations. ORD has conducted a round robin test of TTR methods that included the ORETF roller (Fortune 1997). While ORD concluded that the ORETF roller performed the best of all methods, transfer efficiency for three liquid herbicide formulations indicated a transfer efficiency of ~0.5%. The ORETF data was not used with the revised Transfer Coefficients referenced in current residential SOP since these revised TCs are based on TTR transfer efficiencies of ~1-5% (transfer efficiency = % of the application rate). Therefore the TTR values from this study is not included in this assessment.

Dermal Exposure to Golf Course Turfgrass

According to a 1992 report from *The Center For Golf Course Management*, 12.2 percent of the population are golfers (i.e., 28.5 million people). Golfing is considered a lifetime sport so individuals of all ages, excluding very small children, routinely play. Children who are 12 years of age or older are likely to represent the vast majority of the youth that play golf on any sort of routine basis. However, the popularity of golf as a recreational pastime has increased steadily

over the last few years which has resulted in more and more young children (i.e., less than 12 years old for this discussion) becoming involved in the sport. Risk assessments for these age children are more difficult to complete because of the increased uncertainties associated with any extrapolations using adult dermal exposure data and because of the increased likelihood that other behaviors that might contribute to exposure such as mouthing contaminated hands or golf balls.

4.2.2 Post Application Exposure and Risk Estimates

Dermal exposures are calculated using the standard transfer coefficient approach that is used for postapplication exposure assessments.

$ADD_{(t)}$ (mg/kg/day) = (($TTR_{(t)}$ (μg/cm^2) x TC (cm^2/hr) x ET(hr/day) x (1 mg/1000 μg))/(BW (kg))

Where:

ADD	=	average daily dose (mg/kg/day) at time (t) attributable to golfing on previously treated turf (mg/kg/day);
$TTR_{(t)}$	=	turf transferable residue at time (t) (μg/cm^2);
TC	=	transfer coefficient (cm^2/hour);
ET	=	exposure duration (hours); and
BW	=	body weight (kg).

- Duration is 4 hours for a chemical that can be used on all parts of a course (greens, tees, and fairways). This estimate of the average time it takes to play a round of golf which is based on the report completed by the Center For Golf Course Management *[1992 Golf Course Operations: Cost of Doing Business/Profitability*. Library of Congress GV975.G56 1992].

- The dose levels calculated for adult golfers can be considered upper level estimates of exposure because of several reasons including the clothing scenario considered (i.e., shorts and short-sleeved shirts are not worn by all golfers), combining average values across several input parameters mathematically results in an upper percentile calculated product.

- Children of various ages down to the very young (e.g., 4 or 5 years old) are currently playing golf, the agency recognize this but has not yet developed a quantitative approach for calculating their risk.

Dermal Exposure values on each day after application were calculated based on the following equation.

$DE_{(t)}$ (mg/day) = ($TTR_{(t)}$ (µg/cm^2) x TC (cm^2/hr) x Hr/Day)/1000 (µg/mg)

Where:

DE = Dermal exposure at time (t) attributable for activity in a previously treated area (mg/day);
TTR = Turf Transferable Residue at time (t) where the longest duration (t) is dictated by the kinetics observed in the TTR study;
TC = Transfer Coefficient; and
Hr = Exposure duration in hours.

The activities that were selected as the basis for the risk assessment are represented by the following transfer coefficients (for short-term and intermediate-term endpoints):

- **Transfer Coefficient = 500 cm^2/hour** for adults involved in a low exposure activity on turf such as golfing or light work activities; based on Policy Memo # 003 .1 "Agricultural Transfer Coefficients," Revised - August 7, 2000..
- **Transfer Coefficient = 14,500 cm^2/hour** for adults involved in a high exposure activity on turf such as heavy yard work; Based on the revised residential SOP - February 2001
- **Transfer Coefficient = 5200 cm^2/hour** for toddler involved in a high exposure activity on turf; Based on the revised residential SOP - February 2001

The dermal risk estimates for adults and children exposed to PCNB while doing activities on turf are shown in Tables 13.

Table 13 : Summary of Risk for Residential Postapplication Activities on Treated Turf with PCNB

Activity	Application Rate (lb ai/acre)	TTR 5% of application rate[a]	Transfer Coefficient (cm^2/hr)[b]	Dermal Dose (mg/kg/day)[c]	MOE[d] (day 0)
high contact lawn activities: adults	32.67	7.09	14500	2.939	40
	43.56	6.89		2.856	30
high contact lawn activities: toddler	32.67	18.3	5200	2.720	110
	43.56	19.77		2.938	80
mowing turf: adults	32.67	18.3	500	0.262	1145
	43.56	24.4		0.349	860
golf course reentry: adult	32.67	18.3	500	0.523	575
	43.57	24.4		0.698	430

a TTR source: 5% of application rate, "Residential SOP Revised February 2001 " was used for determination of MOE's.
b Transfer coefficient from the Residential SOP's (02/01).
c Dermal dose = normalized TTR (µg/cm^2) x TC (cm^2/hr) x conversion factor (1 mg/1,000 µg) x exposure time (2 hrs/day playing or mowing; 4 hrs golfing) / body weight (70 kg adult or 15 kg child 1-6 yrs).
d MOE = NOAEL (300 mg/kg/day; based on a dermal study) / dermal dose
Note: TTR = turf transferable residue
DAT = days after treatment

The oral non-dietary risk estimates for small children from hand-to-mouth and ingestion exposure while playing on PCNB treated turf are contained in Table 14. Risk estimates were combined where applicable for PCNB

- **Dose from hand to mouth activity calculated using Residential SOP 2.3.2:** Postapplication potential dose among toddlers from incidental nondietary ingestion of pesticide residues on residential lawns from hand-to-mouth transfer.
- **Dose from mouthing treated turf calculated using Residential SOP 2.3.3:** Postapplication potential dose among toddlers from the ingestion of pesticide treated turfgrass; and
- **Dose from incidental ingestion of soil calculated using Residential SOP 2.3.4:** Postapplication potential dose among toddlers from the ingestion of soil in pesticide treated areas.

The results of the residential post-application exposure and risk estimates are presented in Tables 13 and 14. The dermal risk estimates for adults and children exposed to PCNB while doing activities on turf are shown in Tables 13. The oral non-dietary risk estimates for small children from hand-to-mouth and ingestion exposure while playing on PCNB treated turf are contained in Table 14. Risk estimates were combined where applicable for PCNB.

Once granules have broken down to PCNB soil residues, the exposure is considered using one of the following scenarios.

Hand to Mouth Transfer

The following demonstrates the method used to calculate exposures that are attributable to a child touching treated turf and then putting their hands in their mouth (SOP 2.3.2):

PDR = (AR * F-DR * CF * SA * EXT * Freq * Hr * (1 mg/1000 µg)

where:

PDR	=	potential dose rate (mg/day)
AR	=	application rate (lb ai/A)
F-DR	=	fraction of residue dislodgeable from wet hands (5%)
CF	=	conversion factor to convert lb ai/A to µg/cm^2 (11.2)
SA	=	surface area of 1 to 3 fingers (20 cm^2);
EXT	=	extraction rate by saliva (50%)
Freq	=	frequency of hand-to-mouth events (20 events/hour); and
Hr	=	exposure duration (2 hours)

As indicated above, the dislodgeable foliar residue represents the amount of pesticide that can be removed from turf by the (potentially wet) hands of a child, while the turf transferable residue represents the amount of chemical on the surfaces of treated leaves that can rub off on dry skin or clothing. These observations are based on empirical data, and therefore the Residential SOP standard 5% of the amount ai applied is used, rather than the data from the TTR

study. The surface area for 1-3 fingers used (20 cm^2) is the median surface area for a toddler (age 3 years) as updated by the SAP in 12/99. The frequency of hand-to-mouth events is 20 events per hour as updated in 12/99. The 2 hour duration value is a recommended value from the U.S. EPA Exposure Factors Handbook. This model for hand-to-mouth dose is based on the premise that a child puts 2-3 fingers in their mouths, 50% of the residues on the hands are transferred from the hands to the mouth, and that all of the dislodgeable residues available on the treated turf transfer to the child's hand each time they exhibit this behavior.

The following illustrates the approach used to calculate exposures that are attributable to a child mouthing treated turf (SOP 2.3.3):
where:

PDR = (AR * F-DR * CF * IgR * (1 mg/1000µg)

where:

PDR	=	potential dose rate (mg/day);
AR	=	application rate
F-DR	=	fraction of residue dislodgeable from contaminated object (20%)
CF	=	conversion factor to convert lb ai/A to µg/cm^2 (11.2)
IgR	=	ingestion rate for mouthing of grass per day (25 cm^2/day)

The ingestion rate used (25 cm^2/day) assumes that a child will grab a handful of turf or contaminated object, mouth it and remove all PCNB residues, and then remove it from their mouth. The surface area of (25 cm^2/day) is thought to approximate a handful of turf that is mouthed.

<u>Incidental Soil Ingestion</u>
The following is the formula used to estimate exposure from incidental ingestion of soil treated with PCNB:

PDR = (AP * $(1\text{-}D)^t$ * IgR * CF1 * CF2 * CF3 * CF4)

where:

PDR	=	potential dose rate (mg/kg/day)
AP	=	application rate (lb ai/A)
(1-D)	=	fraction or residue retained on uppermost 1 cm of soil, assumed to be 100 percent based on soil incorporation into top 1 cm of soil after application (1.0/cm)
t	=	postapplication day on which exposure is being assessed, assumed to be day zero
IgR	=	ingestion rate of soil (100 mg/day)
CF1	=	weight unit conversion factor to convert the lbs ai in the application rate to µg for the soil residue value (4.54 x 10^8 µg/lb)
CF2	=	area unit conversion factor to convert the surface area units (ft^2) in

		the application rate to cm^2 for the SR value (2.47×10^{-8} acre/cm^2 if the application rate is per acre)
CF3	=	volume to weight unit conversion factor to convert the volume units (cm^3) to weight units for the SR value (0.67 cm^3/g soil)
CF4	=	weight unit conversion factor to convert the µg of residues on the soil to grams to provide units of mg/day (1E-6 g/µg)

The estimated exposure from ingestion of soil from an area treated with pesticide is a minor contributor to the total incidental oral dose.

Table 14:Residential Oral Non-dietary Short-term Postapplication Risks for PCNB

Exposure Scenario	Route of Exposure	Population	Application Rate[a]	MOE[b]
Short-term Postapplication Exposures				
Hand to Mouth Activity on Turf	Oral	Toddler	32.67	2
			43.56	2
Object to Mouth Activity on Turf	Oral	Toddler	32.67	8
			43.56	6
Incidental Soil Ingestion	Oral	Toddler	32.67	612
			43.56	460
Intermediate-term Postapplication Exposures				
Hand to Mouth Activity on Turf	Oral	Toddler	32.67	1
			43.56	1
Object to Mouth Activity on Turf	Oral	Toddler	32.67	8
			43.56	6
Incidental Soil Ingestion	Oral	Toddler	32.67	612
			43.56	460

a Application rates represent a range of label rates of 32.67- 43.56 lb ai/acre for all liquid and granular products which may be applied to residential and recreational lawns either professionally or by a consumer.

Incidental oral doses were calculated using formulas presented in the Residential SOPs (updated 1999-2000). Short-term doses were calculated using the following formulas:

b MOE = NOAEL (1 mg/kg/day for both short- and intermediate-term assessments) / Oral Dose (mg/kg/day). Aggregate MOEs = NOAEL / [sum of incidental oral doses] with an target MOE of 1000.

Hand-to-mouth oral dose to children on the day of treatment (mg/kg/day) = [application rate (lb ai/acre) x fraction of residue dislodgeable from potentially wet hands (5%) x 11.2 (conversion factor to convert lb ai/acre to µg/cm^2)] x median surface area for 1-3 fingers (20 cm^2/event) x hand-to-mouth rate (20 events/hour) x exposure time (2 hr/day) x 0.001 mg/µg] x 50% extraction by saliva / bw (15 kg child 1-6 yrs). This formula is based on proposed changes to the December 1999 Residential SOPs.

Turf mouthing oral dose to child on the day of treatment (mg/kg/day) = [application rate (lb ai/acre) x fraction of residue dislodgeable from potentially wet hands (20%) x 11.2 (conversion factor to convert lb ai/acre to µg/cm^2) x ingestion rate of grass (25 cm^2/day) x .001 mg/µg] / bw (15 kg child 1-6 yrs).

Soil ingestion oral dose to child on the day of treatment (mg/kg/day) = [(application rate (lb ai/acre) x fraction of residue retained on uppermost 1 cm of soil (100% or 1.0/cm) x 4.54e+08 µg/lb conversion factor x 2.47e-08 acre/cm^2 conversion factor x 0.67 cm^3/g soil conversion factor) x 100 mg/day ingestion rate x 1.0e-06 g/µg conversion factor] / bw (15 kg; child 1-6 yrs). Short term dose based residue on the soil on day of application.

The following specific assumptions and factors were used in order to complete this exposure assessment:

- These assessments were based on the guidance provided in the Residential SOPs and updated in Revisions to the SOPs (February 2001) based on the 1999 SAP comments. Several of the assumptions and factors used in the exposure

assessment are described in that document.

- Calculations for short-term risks are based on the maximum application rate for turf,
- Due to a lack of chemical-specific exposure data, HED has calculated exposure values for adults using surrogate dermal transfer coefficients that represent activities such as mowing, golfing, and yard work.

For PCNB, a 70 kg median body weight for dermal exposures for all adults was used. The average body weight used in all assessments for 3-year old children is 15 kg based on the SOPs For Residential Exposure Assessment. For oral exposures for children, the oral NOAEL of 1 mg/kg/day for general population is used.

The NOAELs and the uncertainty factors that apply to all PCNB risk estimates are listed in Section 1.1 above. The non-occupational target MOE is 1000 for PCNB. MOEs were calculated using the following formula:

Where: MOE = ADD/NOAEL

MOE= margin of exposure or ratio of chemical exposure to the endpoint of concern;

Absorbed Daily Dose (ADD)= the absorbed dose received from exposure to a pesticide in a given scenario (mg pesticide active ingredient/kg body weight/day); and

NOAEL= the highest dose level in a toxicity study where no observed adverse effects occur (mg pesticide active ingredient/kg body weight/day).

4.2.3 Summary of Postapplication Risks

Short-term PCNB risk estimates resulting from dermal contact with treated turf during high contact lawn activities at applications rate of 32.67 lbs ai/A and 43.560 lbs ai/A did exceed the level of concern for adults (MOE 30-40) or for children (MOE 82-110). Activities such as golfing and mowing lawns treated with PCNB at applications rate of 32.67 lbs ai/A resulted in MOEs of 860-1145 and 575-430, respectively, and exceeds HED's level of concern.

The risk calculations for small children's non-dietary ingestion of PCNB on treated turf indicate that risks exceed the level of concern for hand-to-mouth transfer (MOE=2). Incidental turfgrass mouthing (MOEs 6-8) and incidental ingestion of soil (460-612).

Potential residential exposures are anticipated as a result of resident application and professional lawn care operator application. Risk estimates were performed for potential contact with lawn and soil treated with PCNB, using residential SOP.

The target non-occupational MOE was 1000 for PCNB. The resulting surrogate residential postapplication assessment indicates that dermal contact after lawn is sprayed at typical application rates would result in PCNB MOEs of concern (i.e., under the target of 1000). Aggregating, or adding residential handler exposure and postapplication exposure also results in MOEs below 1000. .

The Residential SOPs are considered to be conservative scenarios for determining risk estimates. The adult and children's transfer coefficients are based on the Jazzercise protocol which represents an upper percentile exposure duration value.

APPENDIX A

USE INFORMATION

Table A1: PCNB Use Information					
Registration No	% A.I.	Product Name	Crop Type	MAX. App. Rate (lbs ai/A)	Application Intervals
100-792	10	Mefenoxam PC	Beans (Dry & green, bush and pole)	1.1	At planting
100-792	10	Mefenoxam PC	Cotton	1.0	
100-792	10	Mefenoxam PC	Peanuts	5	At planting and early pegging
100-823	10	Ridomil Gold PC GR	Beans (Dry & Green, bush and pole)	1.1	At planting
100-823	10	Ridomil Gold PC GR	Cotton	1.0	
10163-123	10	Gowan PCNB 10 G	Beans (not specified)	1.5	At planting only
10163-123	10	Gowan PCNB 10 G	Broccoli	30	At planting only
10163-123	10	Gowan PCNB 10 G	Brussels Sprouts	30	At planting only
10163-123	10	Gowan PCNB 10 G	Cabbage	30	At planting only
10163-123	10	Gowan PCNB 10 G	Cauliflower	30	At planting only
10163-123	10	Gowan PCNB 10 G	Collards	30	At planting only
10163-123	10	Gowan PCNB 10 G	Cotton	1.5	At planting only
10163-123	10	Gowan PCNB 10 G	Kale	30	At planting only
10163-123	10	Gowan PCNB 10 G	Mustard Greens	30	At planting only
10163-123	10	Gowan PCNB 10 G	Peanuts	5	
10163-123	10	Gowan PCNB 10 G	Potatoes	11.7	Preplant
10163-123	10	Gowan PCNB 10 G	Turf	32.7	Re-apps at lower rate
10404-37	12.5	Lesco 10-3-23 + PCNB	Turf	32.7	At lower rates, multiple re-apps
10404-38	10	Lesco PCNB - 10%	"ROW" - no crop specified	24	3 re-apps at 15 day intervals
10404-38	10	Lesco PCNB - 10%	Bulbs: Dutch Iris	150	Pre-plant
10404-38	10	Lesco PCNB - 10%	Bulbs: Easter Lily	200	Pre-plant
10404-38	10	Lesco PCNB - 10%	Bulbs: Gladiolus	120	Pre-plant
10404-38	10	Lesco PCNB - 10%	Bulbs: Gladiolus	120	Pre-plant
10404-38	10	Lesco PCNB - 10%	Bulbs: Hyacinth, Iris, Narcissus, Tulip	200	Pre-plant
10404-38	10	Lesco PCNB - 10%	Plants: Bedding & Flowering	65.3	At seeding
10404-38	10	Lesco PCNB - 10%	Plants: Calendula, Larkspur, snapdragon, sweet pea	100	Pre-plant
10404-38	10	Lesco PCNB - 10%	Turf	32.7	re-apps at lower rate
19713-312	2 lb ai/ gal	Drexel PCNB 2-E Liquid	Azalea, Camellia	217.8	Pre bloom
19713-312	2 lb ai/gal	Drexel PCNB 2-E Liquid	Turf	32.7	1 re-app
264-319	10	Temik TSX	Cotton	1.5	90 day PHI
264-475	10	MOCAP PCNB 3-10	Peanuts	10	At early pegging
2935-208	2 lb ai /gal	PCNB 2 Spray	Beans (Bush)	1.5	At planting
2935-208	2 lb ai / gal	PCNB 2 Spray	Beans (Pole)	1.5	At planting
2935-208	2 lb ai / gal	PCNB 2 Spray	Beans: Snap/Dry (Bush)	2.0	At planting
2935-208	2 lb ai / gal	PCNB 2 Spray	Beans: Snap/Dry (Pole)	2.0	At planting
2935-208	2 lb ai / gal	PCNB 2 Spray	Cotton	2	At planting
2935-208	2 lb ai / gal	PCNB 2 Spray	Garlic	20.0	At planting
2935-357	10	PCNB 10 Granular	Cotton	1	over seed and soil at planting time
2935-362-AA	6.5	Disyston 6.5 + PCNB 6.5 Soil Fung. Gran.			NA
2935-419	2 lb ai / gal	PCNB Seed-Coat	Seed treatment: Barley, oats, wheat, cotton, safflower	0.25 lb ai/ 100 lb seeds	
32802-36	10	Soil Fungicide	Beans (Bush)	1.5	At planting
32802-36	10	Soil Fungicide	Beans (Pole)	1.5	At planting
32802-36	10	Soil Fungicide	Broccoli	30	Pre- or At planting
32802-36	10	Soil Fungicide	Brussels Sprouts	30	Pre- or At planting
32802-36	10	Soil Fungicide	Bulbs: Dutch Iris	150	Pre-plant
32802-36	10	Soil Fungicide	Bulbs: Easter Lily	200	Pre-plant
32802-36	10	Soil Fungicide	Bulbs: Gladiolus	120	Pre-plant
32802-36	10	Soil Fungicide	Bulbs: Hyacinth, Iris (Bulbous), Narcissus, Tulips	200	Pre-plant
32802-36	10	Soil Fungicide	Cabbage	30	Pre- or At planting

32802-36	10	Soil Fungicide	Cauliflower	30	Pre- or At planting
32802-36	10	Soil Fungicide	Cotton	2	At planting
32802-36	10	Soil Fungicide	Peanuts	2	At planting over seed
32802-36	10	Soil Fungicide	Plants: Bedding & Flowering	65.3	At seeding
32802-36	10	Soil Fungicide	Plants: Calendula, Larkspur, snapdragon, sweet pea	100	Pre-plant
32802-36	10	Soil Fungicide	Potatoes	25	Pre-plant
32802-36	10	Soil Fungicide	Turf	32.7	1 re-app 3-4 wks later at higher rate
34704-287	6.5	Dot-Son Brand Stand-Aid	Cotton	0.96	Only at planting time.
34704-44	25	Clean Crop PCNB Seed Treater	Seed Treatment: wheat, oats, barley	0.0625 lbs ai/ bushel	NA
34704-679	2 lb ai/gal	PCNB + Liquid Seed Treater	Seed treatment: beans, corn, cotton, peanuts, peas, sorghum, soybeans, safflower, wheat, barley	0.25 lb ai/100 lbs seed	NA
34704-680	2 lb ai/gal	PCNB 2EC-LF Liquid Seed Treater	Seed treatment: barley, oats, wheat	0.0625 lb ai/ bushel	NA
400-399	75	Terraclor 75 WP	Azalea, Camellia	217.8	
400-399	75	Terraclor 75 WP	Azalea, Camellia	217.8	Pre bloom
400-399	75	Terraclor 75 WP	Beans (Dry, Succulent, Snap)	1.5	Only at planting
400-399	75	Terraclor 75 WP	Broccoli	30	Only at planting
400-399	75	Terraclor 75 WP	Brussels Sprouts	30	Only at planting
400-399	75	Terraclor 75 WP	Bulbs: Gladiolus	179.7	Pre-planting
400-399	75	Terraclor 75 WP	Bulbs: Hyacinth, Iris (Bulbous), Narcissus, Tulips	1.5 lb/3.2 gal	
400-399	75	Terraclor 75 WP	Bulbs: Hyacinth, Iris (Bulbous), Narcissus, Tulips	212.4	
400-399	75	Terraclor 75 WP	Bulbs: Lilies (Easter, Asiatic, Oriental)	4.5lb ai/100 gal	Pre or at plant
400-399	75	Terraclor 75 WP	Bulbs: Lilies (Easter, Asiatic, Oriental)	212.4	Pre or at plant
400-399	75	Terraclor 75 WP	Bulbs: Lilies (Easter, Asiatic, Oriental)	4.5lb ai/100 gal	Pre or at plant
400-399	75	Terraclor 75 WP	Cabbage	30	Only at planting
400-399	75	Terraclor 75 WP	Cauliflower	30	Only at planting
400-399	75	Terraclor 75 WP	Chinese broccoli	30	Only at planting
400-399	75	Terraclor 75 WP	Chinese Cabbage	30	Only at planting
400-399	75	Terraclor 75 WP	Collards	30	Only at planting
400-399	75	Terraclor 75 WP	Cotton	2.1	Only at planting
400-399	75	Terraclor 75 WP	Garlic	20.1	Only at planting
400-399	75	Terraclor 75 WP	Kale	30	Only at planting greens only in GA
400-399	75	Terraclor 75 WP	Kale		Only at planting greens only in GA
400-399	75	Terraclor 75 WP	Magnolia	1.5lb ai/100 gal	4 sprays at 2 week intervals
400-399	75	Terraclor 75 WP	Mustard Greens	30	Only at planting greens only in GA
400-399	75	Terraclor 75 WP	Peanuts	10.0	At plant
400-399	75	Terraclor 75 WP	Peppers	7.5	Only at planting
400-399	75	Terraclor 75 WP	Peppers		At transplanting
400-399	75	Terraclor 75 WP	Pine Seedlings (Southern)	36.8	At planting
400-399	75	Terraclor 75 WP	Plants: Bedding, Flowering, Foliage, & Woody	40.8	Bedding: 1 re app 4-6 wks later
400-399	75	Terraclor 75 WP	Plants: Cut Flowers	1.5lb ai/100 gal	Prior to storage
400-399	75	Terraclor 75 WP	Plants: Hyacinth, Iris (bulbous), Narcissus, Tulips	212.4	
400-399	75	Terraclor 75 WP	Plants: Vegetable Bedding (Beans - not cowpeas - broccoli, brussels Sprouts, cabbage, cauliflower, peppers, tomatoes)	40.8	Prior to transplanting from containers or beds into the field. One re-app 4-6 wks after first app.
400-399	75	Terraclor 75 WP	Tomatoes	7.5	At planting

400-399	75	Terraclor 75 WP	Turf: Golf courses, sod farms, home lawns, comm. Turf)	32.7	
400-400	2 lb ai/ gal	Terraclor 2LB EC	Beans: Dry, succulent and snap	1.5	At planting only.
400-400	2 lb ai/ gal	Terraclor 2LB EC	Cotton	2	Only at planting
400-400	2 lb ai/ gal	Terraclor 2LB EC	Garlic	20	Only at planting
400-401	99.7	Terraclor Technical	Formulation for seed treatments and soil treatments		
400-402	10	Gowan PCNB 10 G	Beans (not specified)	1.5	Only at planting
400-402	10	Terrachlor 10%G	Broccoli	30	Only at planting
400-402	10	Terrachlor 10%G	Brussels Sprouts	30	Only at planting
400-402	10	Terrachlor 10%G	Cabbage	30	Only at planting
400-402	10	Terrachlor 10%G	Cauliflower	30	Only at planting
400-402	10	Terrachlor 10%G	Chinese broccoli	30	Only at planting
400-402	10	Terrachlor 10%G	Chinese Cabbage	30	Only at planting
400-402	10	Terrachlor 10%G	Collards	30	Only at planting
400-402	10	Terrachlor 10%G	Cotton	2	Only at planting
400-402	10	Terrachlor 10%G	Hot Peppers	1.3	Only at planting
400-402	10	Terrachlor 10%G	Kale	30	Only at planting
400-402	10	Terrachlor 10%G	Mustard Greens	30	Only at planting
400-402	10	Terrachlor 10%G	Peanuts	10	Only at planting
400-402	10	Terrachlor 10%G	Plants: Vegetable Bedding (beans, broccoli, Sprouts,cabbage, cauliflower, peppers, tomatoes)	0.15lbsai/cu. yd	Seeding/transplanting
400-403	2 lb ai/ gal	Greenback Lawn Fungicide	Turf - home lawn	21.8	1 re-app
400-404	2 lb ai/ gal	Turfcide 2 Lb. EC	Azalea, Camellia	217.8	Pre-bloom
400-404	2 lb ai/ gal	Turfcide 2 Lb. EC	Turf - home lawn	32.7	1 re-app
400-405	2 lb ai/ gal	Terraclor Super X EC	Cotton	1.5	At planting
400-406	10	Terraclor Super X G	Cotton	1.2	At planting
400-407	10	Turfcide 10% Granular	Azalea, Camellia	290.4	Pre bloom
400-407	10	Turfcide 10% Granular	Beans (not specified)	1.4	At planting
400-407	10	Turfcide 10% Granular	Broccoli	30.0	Pre-plant or at plant
400-407	10	Turfcide 10% Granular	Brussels Sprouts	30.0	Pre-plant or at plant
400-407	10	Turfcide 10% Granular	Bulbs: Gladiolus, Hyacinths, Iris, Lilies (Easter/Asiatic/Oriental), Narcissus, Tulips	174.2	Band-make4 apps at 15 day intervals
400-407	10	Turfcide 10% Granular	Cabbage	30.0	Pre-plant or at plant
400-407	10	Turfcide 10% Granular	Cauliflower	30.0	Pre-plant or at plant
400-407	10	Turfcide 10% Granular	Container plants		4 mo (containers)
400-407	10	Turfcide 10% Granular	Peppers	7.4	At planting
400-407	10	Turfcide 10% Granular	Plants: Bedding, Flowering, Foliage, & Woody	0.15lbsai/cu. yd	Pre- or at-planting
400-407	10	Turfcide 10% Granular	Plants: Flowering, Foliage, Trees & Shrub Ornamentals	0.1 lbs ai/cu. yd	
400-407	10	Turfcide 10% Granular	Plants: Flowering, Foliage, Trees & Shrub Ornamentals	130.7	
400-407	10	Turfcide 10% Granular	Plants: Flowering, Foliage, Woody & Bedding	87.1	Pre- or at-planting
400-407	10	Turfcide 10% Granular	Plants: Vegetable Bedding (container broccoli, brus sprouts, cabbage, cauliflower, tomatoes, peppers)	0.15lbsai/cu. yd	At planting
400-407	10	Turfcide 10% Granular	Tomatoes	21.8	At planting
400-407	10	Turfcide 10% Granular	Turf: Golf courses, sod farms, home lawns, inst'tl turf)	43.6	3-4 wks later
400-407	10	Turfcide 10% Granular	Turf: Home Lawns & Gardens	32.7	3-4 wks. Later
400-408	6.5	Terrachlor Super X With Dy-Syston	Cotton	0.98	At planting
400-411	6.5	Terraclor 6.5% Plus Di-Syston 6.5%	Cotton	0.98	At planting

400-412	6.5	Terraclor 6.5% Plus	Cotton	0.98	At planting
400-414	90				
400-453	4 lb ai /gal	Terraclor Flowable	Beans (Dry, succulent & snap)	1.5	at planting
400-453	4 lb ai /gal	Terraclor Flowable	Broccoli	30	at or prior to planting
400-453	4 lb ai /gal	Terraclor Flowable	Broccoli		At transplant
400-453	4 lb ai /gal	Terraclor Flowable	Brussels Sprouts	30	at or prior to planting
400-453	4 lb ai /gal	Terraclor Flowable	Brussels Sprouts		At transplant
400-453	4 lb ai /gal	Terraclor Flowable	Cabbage	30	at or prior to planting
400-453	4 lb ai /gal	Terraclor Flowable	Cabbage		At transplant
400-453	4 lb ai /gal	Terraclor Flowable	Cauliflower	30	at or prior to planting
400-453	4 lb ai /gal	Terraclor Flowable	Cauliflower		At transplant
400-453	4 lb ai /gal	Terraclor Flowable	Chinese broccoli	30	at or prior to planting
400-453	4 lb ai /gal	Terraclor Flowable	Chinese broccoli		At transplant
400-453	4 lb ai /gal	Terraclor Flowable	Chinese Cabbage	30	at or prior to planting
400-453	4 lb ai /gal	Terraclor Flowable	Chinese Cabbage		At transplant
400-453	4 lb ai /gal	Terraclor Flowable	Collards	30	at or prior to planting; In GA only
400-453	4 lb ai /gal	Terraclor Flowable	Collards		at or prior to planting; In GA only
400-453	4 lb ai /gal	Terraclor Flowable	Cotton	1.5	at planting
400-453	4 lb ai /gal	Terraclor Flowable	Garlic	20	
400-453	4 lb ai /gal	Terraclor Flowable	Hot Peppers	1.5	at planting
400-453	4 lb ai /gal	Terraclor Flowable	Kale	30	at or prior to planting; In GA only
400-453	4 lb ai /gal	Terraclor Flowable	Mustard Greens	30	at or prior to planting; In GA only
400-453	4 lb ai /gal	Terraclor Flowable	Peanuts	10	At planting, peggin, cultivation
400-453	4 lb ai /gal	Terraclor Flowable	Peppers	7.2	Pre-or at planting
400-453	4 lb ai /gal	Terraclor Flowable	Plants: Vegetable Bedding (beans, broccoli, Bruss. Sprouts, cabbage, cauliflower, peppers, tomatoes)	40.8	In beds or containers prior to transplanting to field
400-453	4 lb ai /gal	Terraclor Flowable	Tomatoes	7.2	Pre-or at planting or transplanting
400-454	4 lb ai /gal	Turfcide 4F	Azalea, Camellia	217.8	Every 3-4 wks thru bloom
400-454	4 lb ai /gal	Turfcide 4F	Bulbs: Gladiolus	119.8	Pre-plant
400-454	4 lb ai /gal	Turfcide 4F	Bulbs: Iris, narcissus, tulip	212.4	At planting. Band: 3 re-apps at 15 day intervals
400-454	4 lb ai /gal	Turfcide 4F	Bulbs: Iris, narcissus, tulip	1.5lbai./3.2 gals	
400-454	4 lb ai /gal	Turfcide 4F	Bulbs: Lilies	4.5 lb/100 gal	
400-454	4 lb ai /gal	Turfcide 4F	Bulbs: Lilies	212.4	Pre- or at plant
400-454	4 lb ai /gal	Turfcide 4F	Magnolia	1.5lb ai/100 gal	at least 4 sprays at 2 week intervals
400-454	4 lb ai /gal	Turfcide 4F	Pine Seedlings (Southern)	38.1	Pre-plant
400-454	4 lb ai /gal	Turfcide 4F	Plants: Bedding, Flowering, Foliage, & Woody	7.2	1 re-app; 4-6 wks after treatment
400-454	4 lb ai /gal	Turfcide 4F	Plants: Bedding, Flowering, Foliage, & Woody	40.8	1 re-app; 4-6 wks after treatment
400-454	4 lb ai /gal	Turfcide 4F	Plants: Cut Flowers	1.5lb ai/100 gal	Prior to storage
400-454	4 lb ai /gal	Turfcide 4F	Plants: Vegetable Bedding (container broccoli, brus.sprts, cabbage, peppers, tomatoes)	40.8	One re-app at 4-6 wks
400-454	4 lb ai /gal	Turfcide 4F	Turf: Golf courses, sod farms, home lawns	32.7	turf- Retreat 3-4 wks
400-455	2 lb ai/gal	Terraclor Super X	Cotton	1.5	At planting only
400-456	15	Terraclor Super X 18.8G	Cotton	1.5	At planting
400-457	15	Turfcide 15G	Bulbs: Gladiolus	98.0	At planting
400-457	15	Turfcide 15G	Bulbs: hyacinths, iris, Lilies (Easter/Asiatic/oriental), narcissus, tulips	196.0	At planting with soil incorporation. Band: 3 re-apps at 15 day intervals
400-457	15	Turfcide 15G	Plants: Flowering & Foliage	196.0	At planting to seed bed or 1 week prior to planting
400-457	15	Turfcide 15G	Turf: Golf courses, sod farms, home lawns,	32.7	May retreat at weekly or monthly
400-458	15	Terraclor 15G	Beans (not specified)	1.5	At planting

400-458	15	Terraclor 15G	Broccoli	30	At planting
400-458	15	Terraclor 15G	Brussels Sprouts	30	At planting
400-458	15	Terraclor 15G	Cauliflower	30	At planting
400-458	15	Terraclor 15G	Collards	30	At planting
400-458	15	Terraclor 15G	Cotton	1.95	Only at planting
400-458	15	Terraclor 15G	Kale	30	At planting
400-458	15	Terraclor 15G	Mustard Greens	30	At planting
400-458	15	Terraclor 15G	Peanuts	9	At planting, but 1 re-app for split pegging
400-458	16	Terraclor 15G	Cabbage	30	At planting
400-475	1.5 lbai/gal	Terraclor Super X plus DiSyston EC	Cotton	0.94	At planting
400-479	75	Turfcide WDG	Azalea, Camellia	217.8	Pre-bloom 3-4 wks thru bloom
400-479	75	Turfcide WDG	Bulbs: Gladiolus	179.7	Pre-plant
400-479	75	Turfcide WDG	Bulbs: Hyacinth, iris (bulbous), narcissus, tulip	212.4	Prior to planting; band - 3 re-apps at 15 day intervals
400-479	75	Turfcide WDG	Bulbs: Lilies	212.4	Prior to or at planting.
400-479	75	Turfcide WDG	Bulbs: Lilies	4.5lb ai/100 gal	
400-479	75	Turfcide WDG	Magnolia	1.5lb ai/100 gal	at least 4 sprays at 2 week intervals
400-479	75	Turfcide WDG	Pine Seedlings (southern)	36.8	Prior to planting
400-479	75	Turfcide WDG	Plants: Bedding, Flowering, Foliage, & Woody	16.4	Prior to planting
400-479	75	Turfcide WDG	Plants: Bedding, Flowering, Foliage, & Woody	114.4	Prior to planting
400-479	75	Turfcide WDG	Plants: Cut Flowers	1.5lb ai/100 gal	Dip prior to storage
400-479	75	Turfcide WDG	Plants: Cut Flowers	1.5lb ai/100 gal	Spray prior to storage
400-479	75	Turfcide WDG	Plants: Hyacinth, iris (bulbous), narcissus, tulip	212.4	Prior to planting; band
400-479	75	Turfcide WDG	Plants: Vegetable Bedding (Containers: beans, broccoli, Brussels Sprouts, cabbage, cauliflower, peppers, tomatoes)	40.9	1 re-app
400-479	75	Turfcide WDG	Turf: Golf courses, sod farms, home lawns,	32.7	Prior to or at planting, (higher rates); as often as 7-10 days for turf
48273-17	75	MARMAN PCNB 75% WP	Beans (Bush)	2.1	At planting
48273-17	75	MARMAN PCNB 75% WP	Beans (pole)	2.1	At planting
48273-17	75	MARMAN PCNB 75% WP	Beans: Snap & Dry (Bush)	2.1	At planting
48273-17	75	MARMAN PCNB 75% WP	Beans: Snap/Dry (Pole)	2.1	At planting
48273-17	75	MARMAN PCNB 75% WP	Broccoli		Pre-plant or at seeding
48273-17	75	MARMAN PCNB 75% WP	Broccoli	30	Pre-plant or at seeding
48273-17	75	MARMAN PCNB 75% WP	Broccoli	4.5	Pre-plant or at seeding
48273-17	75	MARMAN PCNB 75% WP	Brussels Sprouts	30	Pre-plant or at seeding
48273-17	75	MARMAN PCNB 75% WP	Brussels Sprouts	4.5	Pre-plant or at seeding
48273-17	75	MARMAN PCNB 75% WP	Cabbage	30	Pre-plant or at seeding
48273-17	75	MARMAN PCNB 75% WP	Cauliflower	30	Pre-plant or at seeding
48273-17	75	MARMAN PCNB 75% WP	Cotton	2.1	
48273-17	75	MARMAN PCNB 75%	Garlic	20.6	

		WP			
48273-17	75	MARMAN PCNB 75% WP	Peanuts	10.0	
48273-17	75	MARMAN PCNB 75% WP	Peppers	7.5	at or prior to planting
48273-17	75	MARMAN PCNB 75% WP	Tomatoes	7.5	at or prior to planting
48273-17	75	MARMAN PCNB 75% WP	Tomatoes	0 . 0 0 2 3 4 l b ai/plant	at or prior to planting
51036-80	10	PCNB-M 10-3G	Peanuts	10	At early pegging
538-096	???	Scotts Lawn Disease Preventer	Turf		In 30 days permitted
538-108	15.4	Scotts' Proturf 14-3-3-FFII	Turf (Commercial)	21.3	Re-app "monthly as needed"
538-116	9.95	Scotts' Lawn Disease Preventer……	Turf - home lawn	21.7	Fall and early spring
5481-197	95				
5481-211	10	PCNB 10% Granules	Potatoes	10	Preplant & At Plant
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Beans (Bush)	1.5	At planting
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Beans (Pole)	1.5	At planting
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Beans: Snap & Dry (Bush)	2.0	At planting
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Beans: Snap/Dry (Pole)	2.0	At planting
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Cotton	2	At planting.
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Garlic	20.0	At planting
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Peanuts	2	At planting
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Potatoes	25	Prior to planting.
5481-212	2 lb ai/ gal	PCNB 2-E Liquid EC	Seed treatment: (barley, beans, corn, cotton, peas, sorghum, soybeans, rice, oats, safflower, sugar beets, wheat)	0.25 lbai / 100 lb seeds	
5481-214	2 lb ai/ gal	PCNB Soil & Turf Liquid Drench	Azalea, Camellia	217.8	Multiple re-apps
5481-214	2 lb ai/ gal	PCNB Soil & Turf Liquid Drench	Turf - home lawn	21.8	Retreat in 3-4 wks
5481-215	2 lb ai/gal	PCNB 2 LF	Seed treatment: (Barley, oats, wheat, cotton)	0.297 lbai / 100 lb seeds	
5481-279	75	PCNB 75%	Azalea, Camellia	217.8	Re-apps thru bloom
5481-279	75	PCNB 75%	Beans (Pole)	1.5	At planting
5481-279	75	PCNB 75%	Broccoli	30	at or prior to planting
5481-279	75	PCNB 75%	Broccoli	4.5	at or prior to planting
5481-279	75	PCNB 75%	Brussels Sprouts	30	at or prior to planting
5481-279	75	PCNB 75%	Brussels Sprouts	4.5	at or prior to planting
5481-279	75	PCNB 75%	Brussels Sprouts		at or prior to planting
5481-279	75	PCNB 75%	Bulbs: Dutch Iris	147.1	"Field Grown Ornamental Crops" - Pre-plant and At planting
5481-279	75	PCNB 75%	Bulbs: Easter Lily, Iris, Hyacinth, Narcissus, Tulips	212.4	"Field Grown Ornamental Crops" - Pre-plant and In Furrow - at planting
5481-279	75	PCNB 75%	Bulbs: Gladiolus	179.7	Prior to planting
5481-279	75	PCNB 75%	Bulbs: Iris, Hyacinth, Narcissus, Tulips, Easter lilies	1 . 5 l b s a i / 3 . 2 gallons	Pre-plant or pre-storage
5481-279	75	PCNB 75%	Cabbage	30	at or prior to planting
5481-279	75	PCNB 75%	Cabbage	4.5	at or prior to planting
5481-279	75	PCNB 75%	Cauliflower	30	at or prior to planting
5481-279	75	PCNB 75%	Cauliflower	4.5	at or prior to planting
5481-279	75	PCNB 75%	Cotton	2.1	
5481-279	75	PCNB 75%	Dormant Roses	1.5lbsai/3.2 gal	Pre-plant or pre-storage
5481-279	75	PCNB 75%	Garlic	20.6	at or prior to planting

5481-279	75	PCNB 75%	Peanuts	10.0	Limit: 3 apps/season
5481-279	75	PCNB 75%	Peppers	7.5	at or prior to planting
5481-279	75	PCNB 75%	Pine seedlings (Southern)	37.5	
5481-279	75	PCNB 75%	Plants: Bedding & Flowering	10.2	Nursery & Greenhouse: at seeding and/or transplanting
5481-279	75	PCNB 75%	Plants: Calendula, Larkspur, Snapdragon, Sweet Peas	114.4	Prior to planting
5481-279	75	PCNB 75%	Plants: Herbaceous & Woody	40.8	Nursery & Greenhouse; at seeding and/or transplanting
5481-279	75	PCNB 75%	Plants: Tropical Foliage	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-279	75	PCNB 75%	Plants: Tropical Foliage	40.8	Nursery & Greenhouse; at seeding and/or transplanting. One repeat re app 4 to 6 weeks later.
5481-279	75	PCNB 75%	Tomatoes	7.5	at or prior to planting
5481-279	75	PCNB 75%	Tomatoes	0.00234 lb ai/plant	at or prior to planting
5481-279	75	PCNB 75%	Turf	32.7	Before or after disease appears
5481-279	75	PCNB 75% WP	Beans (Bush)	1.5	At planting
5481-279	75	PCNB 75% WP	Beans: Snap/Dry (Bush)	1.7	Re-apps at 2-3 wk intervals
5481-279	75	PCNB 75% WP	Beans: Snap/Dry (Pole)	1.7	Re-apps at 2-3 wk intervals
5481-308	30	PCNB-Thiram 30:30 Seed Treatment	Cotton Seedling	1.5	NA
5481-308	30	PCNB-Thiram 30:30 Seed Treatment	Cotton Seedling	0.5	NA
5481-311	10	PCNB-Thiram 10:10 Seed Treatment	Cotton Seedling	1	NA
5481-311	10	PCNB-Thiram 10:10 Seed Treatment	Cotton Seedling	0.3	NA
5481-415	6.5	PCNB Disulfoton 6.5:6.5 G	Cotton	0.9	
5481-419	75	PCNB 75W	Azalea, Camellia	217.8	Re-apps
5481-419	75	PCNB 75W	Bulbs: Gladiolus	179.7	Field Grown. Prior to or at planting
5481-419	75	PCNB 75W	Bulbs: Iris, Hyacinth, Narcissus, Tulips, Easter lilies	1.5lbsai/3.2 gal	NA
5481-419	75	PCNB 75W	Dormant Roses	1.5lbsai/3.2 gal	NA
5481-419	75	PCNB 75W	Pine seedlings (Southern)	37.5	Pre-plant
5481-419	75	PCNB 75W	Plants: Bedding & Flowering	10.2	Nursery & Greenhouse: at seeding and/or transplanting
5481-419	75	PCNB 75W	Plants: Dutch Iris	147.0	Field-grown. At planting; Band
5481-419	75	PCNB 75W	Plants: Herbaceous & Woody	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-419	75	PCNB 75W	Plants: Hyacinth, iris, lilies, narcissus, tulips	212.3	Pre-plant. Field-grown. In Furrow: 3 re-applications
5481-419	75	PCNB 75W	Plants: Tropical Foliage	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-419	75	PCNB 75W	Turf: Golf Courses, sod farms, home lawns, Turf)	32.7	Lower rates on turf -re-applications
5481-438	80				
5481-441	75	PCNB 75DG	Azalea, Camellia	217.8	Every 3-4 wks during bloom
5481-441	75	PCNB 75DG	Bulbs: Dutch Iris	147.0	Field Grown: Pre planting; Band:
5481-441	75	PCNB 75DG	Bulbs: Easter Lilies, Hyacinth, Iris, Narcissus, Tulips	196.0	Field Grown: At planting
5481-441	75	PCNB 75DG	Bulbs: Easter Lilies, Hyacinth, Iris, Narcissus, Tulips	212.3	Field grown: Pre-plant
5481-441	75	PCNB 75DG	Bulbs: Gladiolus	179.7	Field grown. Broadcast Pre planting or At planting
5481-441	75	PCNB 75DG	Bulbs: Iris, Hyacinth, Narcissus, Tulips, Easter lilies	1.5lbsai/3.2 gal	Pre-plant or pre-storage

5481-441	75	PCNB 75DG	Dormant Roses	1.5lb ai/100 gal	Pre-plant or pre-storage
5481-441	75	PCNB 75DG	Pine seedlings (Southern)	37.5	Pre-plant
5481-441	75	PCNB 75DG	Plants: Bedding & Flowering	10.2	Nursery & Greenhouse: at seeding and/or transplanting
5481-441	75	PCNB 75DG	Plants: Calendula, Larkspur, Snapdragon, Sweet Peas	114.4	Field grown: Pre-plant
5481-441	75	PCNB 75DG	Plants: Dutch Iris	147.0	Field Grown: Pre- planting; Band:
5481-441	75	PCNB 75DG	Plants: Herbaceous & Woody	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-441	75	PCNB 75DG	Plants: Tropical Foliage	40.8	Nursery & Greenhouse: at seeding and/or transplanting;
5481-441	75	PCNB 75DG	Turf: Golf Courses, sod farms, home lawns, institut. Turf)	32.7	Lower rates on turf - multiple re-apps
5481-442	2 lb ai/ gal	PCNB Flowable RTU Seed Protectant	Seed treatment: Barley, beans, corn, cotton, peas, sorghum, soybeans, rice, oats, safflower, sugar beets, wheat	0.25lb/ 100 lb seeds	NA
5481-443	2 lb ai/ gal	Parflo 2F	Azalea, Camellia	217.8	
5481-443	2 lb ai/ gal	Parflo 2F	Bulbs: Easter Lily, iris, hyacinth, narcissus, tulips	202.9	Field Grown. Pre-plant.
5481-443	2 lb ai/ gal	Parflo 2F	Bulbs: Gladiolus	185.1	At planting
5481-443	2 lb ai/ gal	Parflo 2F	Bulbs: Iris, Hyacinth, Narcissus, Tulips, Easter lilies	1.5lbsai/3.2 gal	
5481-443	2 lb ai/ gal	Parflo 2F	Bulbs: Iris, Hyacinth, Narcissus, Tulips, Easter lilies	4.5lbai /100 gal	
5481-443	2 lb ai/ gal	Parflo 2F	Pine Seedlings (Southern)	37.5	Pre-plant
5481-443	2 lb ai/ gal	Parflo 2F	Plants: Bedding & Flowering	10.2	Nursery & Greenhouse: at seeding and/or transplanting
5481-443	2 lb ai/ gal	Parflo 2F	Plants: Calendula, Larkspur, Snapdragon, Sweet Peas	115.9	Field grown: Pre-plant
5481-443	2 lb ai/ gal	Parflo 2F	Plants: Dutch Iris	145.5	Field Grown. Broadcast: Pre-plant. Band: At planting & 3 re-apps at 15 day intervals
5481-443	2 lb ai/ gal	Parflo 2F	Plants: Herbaceous & Woody	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-443	2 lb ai/ gal	Parflo 2F	Plants: Tropical Foliage	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-443	2 lb ai/ gal	Parflo 2F	Turf: Golf Courses, Sod Farms, home lawns, ornamental, recreational turf	32.7	Turf: more reaps
5481-443	2 lb ai/gal	Parflo 2F	Dormant Roses	1.5lbsai/3.2 gal	
5481-443	2 lb ai/gal	Parflo 2F	Dormant Roses	4.5lbai/100 gal	
5481-443	2 lb/ gal	Parflo 2F	Bulbs: Easter Lilies, hyacinth, iris, narcissus, tulips	196.0	Field Grown. At plant.
5481-444	10	PCNB 10G	Azalea, Camellia	217.8	Per 3-4 wks through bloom
5481-444	10	PCNB 10G	Bulbs: Gladiolus, Hyacinths, Iris, Lilies (Easter/Asiatic/Oriental), Narcissus, Tulips	152.5	Field Grown. Broadcast pre-plant
5481-444	10	PCNB 10G	Nursery Growing Media	0.15lbs ai/cu yd	
5481-444	10	PCNB 10G	Pine Seedlings (Southern)	37.0	At or pre-plant
5481-444	10	PCNB 10G	Plants: Bedding & Flowering	87.1	Nursery & Greenhouse: at seeding and/or transplanting
5481-444	10	PCNB 10G	Plants: Calendula, Larkspur, Snapdragon, Sweet Peas	108.9	Pre-plant
5481-444	10	PCNB 10G	Plants: Foliage	87.1	Nursery & Greenhouse: at seeding and/or transplanting.
5481-444	10	PCNB 10G	Plants: Herbaceous & Woody	87.1	At or pre-plant
5481-444	10	PCNB 10G	Plants: Vegetable Bedding	0.15lbsai/cu. yd	At seeding or transplanting
5481-444	10	PCNB 10G	Turf: Golf Courses, Sod Farms, home lawns, instit, ornamental,	43.6	Turf: more reaps at lower rate

			recreational turf		
5481-445	1.7 lb ai/gal	PCNB ST	Seed treatment: Barley, oats, wheat, cotton, beans, peas, corn, safflower, peanuts, sugar beets, rice, soybeans, sorghum	0.25lbai/100lb seeds	
5481-450	20	PCNB 20% WDG Soil Fungicide	Beans (Bush)	1.5	At planting
5481-450	20	PCNB 20% WDG Soil Fungicide	Beans (Pole)	1.5	At planting
5481-450	20	PCNB 20% WDG Soil Fungicide	Broccoli	30	Preplant or pre-transplant
5481-450	20	PCNB 20% WDG Soil Fungicide	Brussels Sprouts	30	Preplant or pre-transplant
5481-450	20	PCNB 20% WDG Soil Fungicide	Bulbs: Hyacinth, iris (bulbous), narcissus, tulips	200	pre-plant
5481-450	20	PCNB 20% WDG Soil Fungicide	Bulbs: Gladiolus	120	pre-plant
5481-450	20	PCNB 20% WDG Soil Fungicide	Bulbs: hyacinth, iris (bulbous), narcissus, tulips	200	pre-plant
5481-450	20	PCNB 20% WDG Soil Fungicide	Cabbage	30	Preplant or pre-transplant
5481-450	20	PCNB 20% WDG Soil Fungicide	Cauliflower	30	Preplant or pre-transplant
5481-450	20	PCNB 20% WDG Soil Fungicide	Cotton	2	
5481-450	20	PCNB 20% WDG Soil Fungicide	Peanuts	10	Cultivation: 3 split apps
5481-450	20	PCNB 20% WDG Soil Fungicide	Plants: Bedding & Flowering	65.3	pre-plant
5481-450	20	PCNB 20% WDG Soil Fungicide	Plants: Calendula, Larkspur, Snapdragon	100	pre-plant
5481-450	20	PCNB 20% WDG Soil Fungicide	Plants: Dutch Iris, Easter Lily	200	3 re-apps at 15 day intervals
5481-450	20	PCNB 20% WDG Soil Fungicide	Potatoes	25	At planting
5481-450	20	PCNB 20% WDG Soil Fungicide	Turf	32.7	Lower rate more re-apps 7-10 day
5481-453	75	PCNB 75 WSP	Azalea, Camellia	217.8	During bloom; multiple reapps intervals
5481-453	75	PCNB 75 WSP	Beans (Bush)	1.5	At planting
5481-453	75	PCNB 75 WSP	Beans (Pole)	1.5	At planting
5481-453	75	PCNB 75 WSP	Broccoli	30	Preplant
5481-453	75	PCNB 75 WSP	Broccoli	4.5	At transplant
5481-453	75	PCNB 75 WSP	Broccoli		Preplant
5481-453	75	PCNB 75 WSP	Brussels Sprouts	30	Preplant
5481-453	75	PCNB 75 WSP	Brussels Sprouts	4.5	At transplant
5481-453	75	PCNB 75 WSP	Brussels Sprouts		Preplant
5481-453	75	PCNB 75 WSP	Bulbs: Gladiolus	179.7	Pre-plant
5481-453	75	PCNB 75 WSP	Bulbs: Iris, Hyacinth, Narcissus, Tulips, Easter lilies	1.5lbsai/3.2 gal	Pre-plant or storage
5481-453	75	PCNB 75 WSP	Cabbage	30	Preplant
5481-453	75	PCNB 75 WSP	Cabbage	4.5	At transplant
5481-453	75	PCNB 75 WSP	Cabbage		Preplant
5481-453	75	PCNB 75 WSP	Cauliflower	30	Preplant
5481-453	75	PCNB 75 WSP	Cauliflower	4.5	At transplant
5481-453	75	PCNB 75 WSP	Cauliflower		Preplant
5481-453	75	PCNB 75 WSP	Cotton	2.1	At planting
5481-453	75	PCNB 75 WSP	Dormant Roses	1.5lbsai/3.2 gal	Pre-plant or storage
5481-453	75	PCNB 75 WSP	Garlic	20.7	At planting
5481-453	75	PCNB 75 WSP	Peanuts	10.0	At cultivation

5481-453	75	PCNB 75 WSP	Peppers	7.5	At planting
5481-453	75	PCNB 75 WSP	Peppers	0.00234 lb ai/plant	At transplant
5481-453	75	PCNB 75 WSP	Pine Seedlings (Southern)	37.5	Pre-plant
5481-453	75	PCNB 75 WSP	Plants: Bedding	40.8	Field Grown.At seeding or transplanting
5481-453	75	PCNB 75 WSP	Plants: Bedding & Flowering	10.2	Nursery & Greenhouse: at seeding and/or transplanting
5481-453	75	PCNB 75 WSP	Plants: Calendula, Larkspur, Snapdragon	375	pre-plant
5481-453	75	PCNB 75 WSP	Plants: Dutch Iris	147.0	Broadcast pre-plant or band at plant
5481-453	75	PCNB 75 WSP	Plants: Herbaceous & Woody	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-453	75	PCNB 75 WSP	Plants: Tropical Foliage	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-453	75	PCNB 75 WSP	Tomatoes	7.5	At planting
5481-453	75	PCNB 75 WSP	Tomatoes	0.00234 lb ai/plant	At planting
5481-453	75	PCNB 75 WSP	Turf: Golf Courses, Sod Farms, home lawns, ornamental, recreational turf	32.7	Pre-plant or at need
5481-457	75	Turfpro WSP	Azaleas, Camellia	217.8	Pre-bloom, thru bloom at 3-4 wk intervals
5481-457	75	Turfpro WSP	Bulbs: Easter Lilies, hyacinth, iris, narcissus, tulips	212.4	Pre-plant
5481-457	75	Turfpro WSP	Bulbs: Gladiolus	179.7	At planting
5481-457	75	Turfpro WSP	Bulbs: Iris, Hyacinth, Narcissus, Tulips, Easter lilies	1.5lbsai/3.2 gal	Pre-plant or storage
5481-457	75	Turfpro WSP	Dormant Roses	1.5lbsai/3.2 gal	Pre-plant or storage
5481-457	75	Turfpro WSP	Pine Seedlings (Southern)	37.5	Pre-plant
5481-457	75	Turfpro WSP	Plants: Bedding & Flowering	10.2	Nursery & Greenhouse: at seeding and/or transplanting
5481-457	75	Turfpro WSP	Plants: Calendula, Larkspur, Snapdragon, Sweet Peas	119.6	Pre- or at planting; for tropical foliage
5481-457	75	Turfpro WSP	Plants: Dutch Iris	16.4	At planting & 3 re-apps
5481-457	75	Turfpro WSP	Plants: Herbaceous & Woody	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-457	75	Turfpro WSP	Plants: Tropical Foliage	40.8	Nursery & Greenhouse: at seeding and/or transplanting
5481-457	75	Turfpro WSP	Turf: Golf Courses, Sod Farms, home lawns, ornamental, recreational turf	32.7	Turf: more reaps at lower rate
5481-464	6 lb ai/gal	Parflo 6F Turf Soil Fungicide	Turf: Golf Courses, home lawns, ornamental, recreational turf	32.7	More reaps at lower rate
5481-465	4 lb ai/gal	Parflo 4F Turf Soil Fungicide	Turf: Golf Courses, home lawns, ornamental, recreational turf	32.7	More reaps at lower rate
5481-471	6 lbs ai/gal	Win-Flo 6F	Cotton	1.5	
5481-472	4 lbs ai/gal	Win-Flo 4F	Cotton	1.5	
7401-163	1 lb ai/gal	Ferti-Lome A-C-G	Azalea, camellia, gardenia	217.8	Re-app at 10-14 day intervals
7401-197	4.67	Ferti-Lome	Turf: Home lawn		
7401-389	4.67	Hi-Yield Terraclor Fungicide	Turf: Home lawn	32.6	
7401-42	2 lb ai / gal	Ferti-Lome	Azalea, Camellia	217.8	Re-apps during bloom
7401-42	2 lb/ gal	Ferti-Lome	Turf: Home lawn	2178	1 re-app 3-4 wks later
7401-84	2 lb ai / gal	Ferti-Lome	Azalea, Camellia	217.8	4 weeks prior to bloom
7401-84	2 lb ai/gal	Ferti-Lome	Plants: Bedding & Flowering	102.1	Pre-plant
7401-84	2 lb ai/gal	Ferti-Lome	Plants: Calendula, Larkspur, Snapdragon, Sweet Peas	102.1	Pre-plant
7401-84		Ferti-Lome	Turf: Home lawn		Turf: more reaps at lower rate

7501-111	10	4-Way Seed Protectant	Seed Treatment - peanuts	0.0625 lb ai/100 lb	NA
7501-126	25	Apron-Terraclor Dust Seed Treatment Fungicide	Seed Treatment: Cotton, peanuts, barley, rice, beans, corn, wheat, soybeans, peas	0.125 lb ai/100 lb	NA
7501-131	2 lb ai/ gal	Rival Flowable	Seed treatment: soybeans, edible dry beans, wheat	0.0625 lb ai/100 lb	NA
7501-139	15	Vitavax-PC Peanut Seed Treatment Fungicide	Seed treatment: Peanuts	0.047 lbs ai/100 lbs	NA
7501-143	75	Terra-Coat WP	Seed Treatment: Beans, barley, corn, cotton, peanuts, peas, sorghum, soybeans, rice, safflower, sugar beets, oats, wheat	0.1875 lb ai/100 lbs	NA
7501-145	15	PREVAIL: Apron-Terraclor-Vitavax	Seed Treatment: Cotton, peanuts, barley, oats, rice, beans, corn, wheat, soybeans	0.15lbai/100bs	NA
7501-148	16.67	Kodiak AT	Seed treatment: Cotton, peanuts, barley, rice, beans, corn, wheat, soybeans, peas	0.125lbai/100lb	NA
7501-153	10	4-Way Peanut Seed Protectant	Seed Treatment: Peanuts	0.0375 lbs ai/100 lbs	NA
7501-49	80	Terraclor 80% Dust	manufacturing		
7501-54	20	Terraclor Super-X 20-5 Dust c/ Graphite	Seed treatment: beans, wheat, peas, sorghum, corn, peanuts, safflower, barley, cotton	0.2lbai/100 lb	NA
7501-55	2 lb ai/gal	Terra-Coat LT 2N	Seed treatment: Barley, oats, wheat, cotton	0.25 lb ai/ 100 lb	NA
7501-57	2 lb ai / gal	Terra-Coat L-2N	Seed Treatment: Beans, barley, corn cotton, peanuts, peas, sorghum, soybeans, safflower, wheat	0.25 lb ai/ 100 lb	NA
7501-70	2.23 lb ai/gal	RTU-PCNB Seed Protectant	Seed Treatment: Beans, barley, corn, cotton, peanuts, peas, sorghum, soybeans, sugar beets, oats, wheat	0.253 lb ai/100 lb	NA
7501-78	1.68 lb ai /gal	RTU-PCNB/Lindane Seed protectant	Seed treatment: wheat, barley	0.105 lb ai/100 lbs	NA
7501-87	1.68 lb ai /gal	Vitavax-PCNB Flowable Fungicide	Seed Treatment - barley, wheat, oats, cotton, soybeans	0.092 lb ai/ 100 lb	NA
9198-152	15	Andersons PCNB Granular Plus Fertilizer	Turf	43.1	Mostly repeat in 1 month if necessary.
AL-800010	2 lb ai/ gal	Terraclor 2 LB Emulsifiable Soil Fungicide	Peanuts	10	At early pegging, can split:
GA-810003	2 lb ai/ gal	Terraclor 2 LB Emulsifiable Soil Fungicide	Peanuts	10	At early pegging, can split:
GA-890003	10	Terraclor 10% G	Peanuts	5	At early pegging; two 25 lb/A apps
GA-940007	4 lb ai/gal	Terraclor Flowable	Peanuts	10	Re-app: 28 days later
ME-790001	75	Terraclor 75% WP	Seed Treatment (Potato Pieces)	0.0375lbai/100 lbs OR (7.5lb / 100 gal)	Pre-plant
OK-840009	2 lb ai/ gal	Terraclor 2 LB Emulsifiable Soil Fungicide	Peanuts	4	May add 1 or 2 re-apps in late season
OK-840011	10	Terraclor 10% G	Peanuts	10	100 lbs/A
OK-84008	75	Terraclor 75% WP	Peanuts	9.75	At early pegging, can split:
OK-940001	4 lb ai /gal	Terraclor Flowable	Peanuts	10	Re-app: 28 days later
PA-980001	4 lbs ai/gal	Terraclor 400	Green mold control on Mushroom Farms	27.2	Re-apps: Hi rate - biweekly April thru October
TX-780043	10	Terraclor 10% G	Peanuts	10	At pegging time
TX-790017	75	Terraclor 75% WP	Peanuts	10.0	At early pegging, can split:
TX-840015	2 lb ai/ gal	Terraclor 2 LB	Peanuts	10	At early pegging, can split

		Emulsifiable Soil Fungicide			
TX-900010	2 lb ai/ gal	PCNB 2-E Liquid Emulsifiable Concentrate Soil Fungicide	Peanuts	10	1 re-app: 2 gal/A 30 days later
TX-91000700	15	TOPS PC Peanut Seed Treatment	Seed Treatment: Peanuts	0.047 lbs ai/100 lbs	NA
TX-940004	4 lb ai/gal	Terraclor Flowable	Peanuts	10	Re-app: 28 days later

APPENDIX B

SHORT- TERM AND INTERMEDIATE- TERM OCCUPATIONAL AND

RESIDENTIAL HANDLER EXPOSURE

RISK

TABLES B1 THROUGH B10

Table B1:Short Term and Intermediate Term Risk at Baseline for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixer/Loader									
Dry Flowables for High-Pressure HandWand application (1)	0.066	0.77	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.0035	85000	0.000041	24000
Dry Flowables for Chemigation application (2)	0.066	0.77	Commercial/industrial lawns	32.67	10	0.31	970	0.0036	280
Dry Flowables for High-Pressure HandWand application (3)	0.066	0.77	Commercial/industrial lawns, residential lawn	0.04	1000 gals	0.035	8500	0.00041	2400
Dry Flowables for Chemigation application (4)	0.066	0.77	Golf course turf (tees/greens)	32.67	10	0.31	970	0.0036	280
Dry Flowables for Chemigation application (5)	0.066	0.77	Golf course turf (fairways)	32.67	40	1.2	240	0.014	70

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Dry Flowables for Chemigation application (6)	0.066	0.77	Sod farms	32.67	350	11	28	0.13	8
Dry Flowables for High-Pressure HandWand application (7)	0.066	0.77	Ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	1.4	210	0.017	61
Dry Flowables for High-Pressure HandWand application (8)	0.066	0.77	Containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.0035	85000	0.000041	24000
Dry Flowables for Groundboom application (9)	0.066	0.77	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	2.3	130	0.026	38
Dry Flowables for Groundboom application (10)	0.066	0.77	Cotton	2	200	0.38	800	0.0044	230
Dry Flowables for Groundboom application (11)	0.066	0.77	Peanuts	11.59	80	0.87	340	0.010	98
Mixing/Loading Liquids for Groundboom application (12)	2.9	1.2	Band treatment (dried beans, succulent beans, lima)	2	80	6.6	45	0.0027	360
Mixing/Loading Liquids for Groundboom application (13)	2.9	1.2	Band treatment, soil treatment (garlic)	20	80	66	4.5	0.027	36
Mixing/Loading Liquids for Chemigation application (14)	2.9	1.2	Ornamental lawn and turf	32.67	5	6.8	44	0.0028	360
Mixing/Loading Liquids for Chemigation application (15)	2.9	1.2	Commercial/industrial lawns	32.67	10	14	22	0.0056	180
Mixing/Loading Liquids for Chemigation application (16)	2.9	1.2	Sod farms	32.67	350	470	0.63	0.20	5.1
Mixing/Loading Liquids for Groundboom application (16a)	2.9	1.2	Sod farms	32.67	80	110	2.8	0.045	22
Mixing/Loading Liquids for Chemigation application (17)	2.9	1.2	Golf course turf	32.67	10	14	22	0.0056	180
Mixing/Loading Liquids for Chemigation application (18)	2.9	1.2	Golf course turf (fairways)	32.67	40	54	5.5	0.022	45
Mixing/Loading Liquids for High-Pressure HandWand application (19)	2.9	1.2	Commercial industrial lawn	0.15	1000 gals	6.2	48	0.0026	390
Mixing/Loading Liquids for Groundboom application (20)	2.9	1.2	Cotton	2	200	17	18	0.0069	150
Mixing/Loading Liquids for Groundboom application (21)	2.9	1.2	Garlic	20	80	66	4.5	0.027	36
Mixing/Loading Liquids for Groundboom application (22)	2.9	1.2	Peanuts	10	80	33	9.1	0.014	73
Mixing/Loading Liquids for Groundboom application (23)	2.9	1.2	Potato	25	80	83	3.6	0.034	29
Mixing/Loading Liquids for Chemigation application (24)	2.9	1.2	Potato	25	350	360	0.83	0.15	6.7
Mixing/Loading Liquids for Aerial application (25)	2.9	1.2	Potato	25	350	360	0.83	0.15	6.7

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading Liquids for Groundboom application (26)	2.9	1.2	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	99	3	0.041	24
Mixing/Loading Liquids for High-Pressure HandWand application (27)	2.9	1.2	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.62	480	0.00026	3900
Mixing/Loading Liquids for Airblast application (28)	2.9	1.2	Foliar spray (magnolia tree)	6	20	5	60	0.0021	490
Mixing/Loading Liquids for Groundboom application (29)	2.9	1.2	Tomato, pepper	7.50	80	25	12	0.010	97
Mixing/Loading Liquids for Groundboom application (30)	2.9	1.2	Southern pine (seed orchard)	42.50	10	18	17	0.0073	140
Mixing/Loading Liquids for Dip tank application (31)	2.9	1.2	Ornamental bulb soak and cut flowers	0.02	100 gals	0.062	4800	0.000026	39000
Loading Granulars for Tractor-Drawn Spreaders application (32)	0.0084	1.7	Beans	1.50	80	0.014	21000	0.0029	340
Loading Granulars for Tractor-Drawn Spreaders application (33)	0.0084	1.7	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.29	1000	0.058	17
Loading Granulars for Tractor-Drawn Spreaders application (34)	0.0084	1.7	Golf course turf (tees/greens)	43.56	10	0.052	5700	0.011	95
Loading Granulars for Tractor-Drawn Spreaders application (35)	0.0084	1.7	Golf course turf (fairways)	43.56	40	0.21	1400	0.042	24
Loading Granulars for Tractor-Drawn Spreaders application (36)	0.0084	1.7	Sod farms	43.56	80	0.42	720	0.085	12
Loading Granulars for Tractor-Drawn Spreaders application (37)	0.0084	1.7	Cotton	2	200	0.048	6300	0.0097	100
Loading Granulars for Tractor-Drawn Spreaders application (38)	0.0084	1.7	Pepper	1.35	80	0.013	23000	0.0026	380
Loading Granulars for Tractor-Drawn Spreaders application (39)	0.0084	1.7	Potato	25	80	0.24	1300	0.049	21
Wettable Powders for Groundboom application (40)	3.7	43	beans(lima, snap, dried)	1.50	80	6.3	47	0.074	14
Wettable Powders for Chemigation application (41)	3.7	43	beans(lima, snap, dried)	1.50	350	28	11	0.32	3.1
Wettable Powders for Chemigation application (42)	3.7	43	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	560	0.54	6.5	0.16

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Wettable Powders for Groundboom application (43)	3.7	43	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	130	2.4	1.5	0.68
Wettable Powders for Chemigation application (44)	3.7	43	commercial/industrial lawns	40.80	10	22	14	0.25	4
Wettable Powders for High-Pressure HandWand application (45)	3.7	43	commercial/industrial lawns	0.50	1000 gals	26	11	0.31	3.3
Wettable Powders for Groundboom application (46)	3.7	43	cotton	2	200	21	14	0.25	4.1
Wettable Powders for Chemigation application (47)	3.7	43	cotton	2	350	37	8.1	0.43	2.3
Wettable Powders for Chemigation application (48)	3.7	43	golf course turf (tees and greens)	40.80	10	22	14	0.25	4
Wettable Powders for Chemigation application (49)	3.7	43	golf course turf (fairways)	40.80	40	86	3.5	1	0.100
Wettable Powders for Chemigation application (50)	3.7	43	sod farms	40.80	350	750	0.4	8.8	0.11
Wettable Powders for Groundboom application (51)	3.7	43	sod farms	40.80	80	170	1.7	2	0.50
Wettable Powders for Groundboom application (52)	3.7	43	Peanuts	2	80	8.5	35	0.098	10
Wettable Powders for Chemigation application (53)	3.7	43	peanuts	2	350	37	8.1	0.43	2.3
Wettable Powders for Groundboom application (54)	3.7	43	pepper, tomato	7.50	80	32	9.5	0.37	2.7
Wettable Powders for Groundboom application (55)	3.7	43	pine (seed orchard)	37.50	10	20	15	0.23	4.3
Applicator									
Sprays for High-Pressure HandWand application (56)	1.8	79	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.096	3100	0.0042	240
Sprays for High-Pressure HandWand application (57)	1.8	79	commercial/industrial lawns, residential lawn	0.04	1000 gals	0.96	310	0.042	24
Sprays for High-Pressure HandWand application (58)	1.8	79	ornamentals (foliar application only)	1.50	1000 gals	39	7.8	1.7	0.59
Sprays for High-Pressure HandWand application (59)	1.8	79	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.096	3100	0.0042	240
Sprays for Groundboom application (60)	0.014	0.74	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	0.48	630	0.025	39
Sprays for Groundboom application (61)	0.014	0.74	Cotton	2	200	0.08	3800	0.0042	240
Sprays for Groundboom application (62)	0.014	0.74	Peanuts	11.59	80	0.19	1600	0.0098	100

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Sprays for Groundboom application (63)	0.014	0.74	Band treatment (dried beans, succulent beans, lima)	2	80	0.032	9400	0.0017	590
Sprays for Groundboom application (64)	0.014	0.74	Band treatment, soil treatment (garlic)	20	80	0.32	940	0.017	59
Sprays for High-Pressure HandWand application (65)	1.8	79	commercial industrial lawn	0.15	1000 gals	3.9	78	0.17	5.9
Sprays for Groundboom application (66)	0.014	0.74	Cotton	2	200	0.08	3800	0.0042	240
Sprays for Groundboom application (67)	0.014	0.74	Garlic	20	80	0.32	940	0.017	59
Sprays for Groundboom application (68)	0.014	0.74	Peanuts	10	80	0.16	1900	0.0085	120
Sprays for Groundboom application (69)	0.014	0.74	Potato	25	80	0.4	750	0.021	47
Sprays for Aerial application (70)	No Data	No Data	potato	25	350	No Data	No Data	No Data	No Data
Sprays for Groundboom application (71)	0.014	0.74	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.48	630	0.025	39
Sprays for High-Pressure HandWand application (72)	1.8	79	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.39	780	0.017	59
Sprays for Airblast application (73)	0.36	4.5	Foliar spray (magnolia tree)	6	20	0.62	490	0.0077	130
Sprays for Groundboom application (74)	0.014	0.74	Tomato, pepper	7.50	80	0.12	2500	0.0063	160
Sprays for Groundboom application (75)	0.014	0.74	Southern pine (seed orchard)	42.50	10	0.085	3500	0.0045	220
Applying Granulars for Tractor-Drawn Spreaders application (76)	0.0099	1.2	Beans	1.50	80	0.017	18000	0.0021	490
Applying Granulars for Tractor-Drawn Spreaders application (77)	0.0099	1.2	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.34	880	0.041	24
Applying Granulars for Tractor-Drawn Spreaders application (78)	0.0099	1.2	Golf course turf (tees/greens)	43.56	10	0.062	4900	0.0075	130
Applying Granulars for Tractor-Drawn Spreaders application (79)	0.0099	1.2	Golf course turf (fairways)	43.56	40	0.25	1200	0.030	33
Applying Granulars for Tractor-Drawn Spreaders application (80)	0.0099	1.2	Sod farms	43.56	80	0.49	610	0.060	17
Applying Granulars for Tractor-Drawn Spreaders application (81)	0.0099	1.2	Cotton	2	200	0.057	5300	0.0069	150
Applying Granulars for Tractor-Drawn Spreaders application (82)	0.0099	1.2	Peanuts	2	80	0.023	13000	0.0027	360

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Applying Granulars for Tractor-Drawn Spreaders application (83)	0.0099	1.2	Pepper	1.35	80	0.015	20000	0.0019	540
Applying Granulars for Tractor-Drawn Spreaders application (84)	0.0099	1.2	Potato	25	80	0.28	1100	0.034	29
Sprays for Groundboom application (85)	0.014	0.74	Beans(lima, snap, dried)	1.50	80	0.024	13000	0.0013	790
Sprays for Groundboom application (86)	0.014	0.74	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.48	630	0.025	39
Sprays for High-Pressure HandWand application (87)	1.8	79	commercial/industrial lawns	0.50	1000 gals	13	23	0.56	1.8
Sprays for Groundboom application (88)	0.014	0.74	Cotton	2	200	0.08	3800	0.0042	240
Sprays for Groundboom application (89)	0.014	0.74	Sod farms	40.80	80	0.65	460	0.035	29
Sprays for Groundboom application (89a)	0.014	0.74	Sod farms	32.67	80	0.52	570	0.028	36
Sprays for Groundboom application (90)	0.014	0.74	Peanuts	2	80	0.032	9400	0.0017	590
Sprays for Groundboom application (91)	0.014	0.74	Pepper, tomato	7.50	80	0.12	2500	0.0063	160
Sprays for Groundboom application (92)	0.014	0.74	Pine (seed orchard)	37.50	10	0.075	4000	0.0040	250
Flagger									
Flagging for Sprays application (93)	0.011	0.35	Potato	25	350	1.4	220	0.044	23
Mixer/Loader/App									
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	No Data	1.8	Ornamentals (herbaceous plants, woody shrubs and vines)	218	5	No Data	No Data	0.028	36
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	No Data	1.8	Ornamental and Lawn turf	32.67	5	No Data	No Data	0.0042	240
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	0.35	7.3	Commercial industrial lawns	43.56	5	1.1	280	0.023	44
Loading/Applying Granulars for Belly Grinder application (97)	10	62	ornamental lawns and turf	43.56	0.5	3.1	96	0.019	52
Loading/Applying Granulars for Belly Grinder application (98)	10	62	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	16	19	0.096	10
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	0.35	7.3	Ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	0.54	550	0.011	88

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	8.6	1100	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5 gals	130	2.2	17	0.058
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	8.6	1100	ornamental (shade trees)	37.50	5 gals	23	13	2.9	0.34

[1]Baseline dermal unit exposures represent long pants, long sleeved shirts, shoes, and socks. Values are reported in the PHED Surrogate Exposure Guide dated August 1998
[2]Baseline inhalation unit exposures represent no respirator. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.
[3]Crops and use patterns are from PCNB labels
[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).
[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).
[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).
[7]Dermal MOE = short-term and intermediate-term endpoint for dermal NOAEL (300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 100.
[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion * Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).
[9]Inhalation MOE = short-term and intermediate-term endpoint for inhalationl NOAEL (1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 100.

Table B2 :Short Term and Intermediate Term Risk with PPE 1 (Single Layer Protection, Gloves, No Respirator) for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixer/Loader									
Dry Flowables for High-Pressure HandWand application (1)	0.066	0.77	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.0035	85000	0.000041	24000
Dry Flowables for Chemigation application (2)	0.066	0.77	Commercial/industrial lawns	32.67	10	0.31	970	0.0036	280

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Dry Flowables for High-Pressure HandWand application (3)	0.066	0.77	Commercial/industrial lawns, residential lawn	0.04	1000 gals	0.035	8500	0.00041	2400
Dry Flowables for Chemigation application (4)	0.066	0.77	Golf course turf (tees/greens)	32.67	10	0.31	970	0.0036	280
Dry Flowables for Chemigation application (5)	0.066	0.77	Golf course turf (fairways)	32.67	40	1.2	240	0.014	70
Dry Flowables for Chemigation application (6)	0.066	0.77	Sod farms	32.67	350	11	28	0.13	8
Dry Flowables for High-Pressure HandWand application (7)	0.066	0.77	Ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	1.4	210	0.017	61
Dry Flowables for High-Pressure HandWand application (8)	0.066	0.77	Containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.0035	85000	0.000041	24000
Dry Flowables for Groundboom application (9)	0.066	0.77	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	2.3	130	0.026	38
Dry Flowables for Groundboom application (10)	0.066	0.77	Cotton	2	200	0.38	800	0.0044	230
Dry Flowables for Groundboom application (11)	0.066	0.77	Peanuts	11.59	80	0.87	340	0.010	98
Mixing/Loading Liquids for Groundboom application (12)	0.023	1.2	Band treatment (dried beans, succulent beans, lima)	2	80	0.053	5700	0.0027	360
Mixing/Loading Liquids for Groundboom application (13)	0.023	1.2	Band treatment, soil treatment (garlic)	20	80	0.53	570	0.027	36
Mixing/Loading Liquids for Chemigation application (14)	0.023	1.2	Ornamental lawn and turf	32.67	5	0.054	5600	0.0028	360
Mixing/Loading Liquids for Chemigation application (15)	0.023	1.2	Commercial/industrial lawns	32.67	10	0.11	2800	0.0056	180
Mixing/Loading Liquids for Chemigation application (16)	0.023	1.2	Sod farms	32.67	350	3.8	80	0.20	5.1
Mixing/Loading Liquids for Groundboom application (16a)	0.023	1.2	Sod farms	32.67	80	0.86	350	0.045	22
Mixing/Loading Liquids for Chemigation application (17)	0.023	1.2	Golf course turf	32.67	10	0.11	2800	0.0056	180
Mixing/Loading Liquids for Chemigation application (18)	0.023	1.2	Golf course turf (fairways)	32.67	40	0.43	700	0.022	45
Mixing/Loading Liquids for High-Pressure HandWand application (19)	0.023	1.2	Commercial industrial lawn	0.15	1000 gals	0.049	6100	0.0026	390
Mixing/Loading Liquids for Groundboom application (20)	0.023	1.2	Cotton	2	200	0.13	2300	0.0069	150
Mixing/Loading Liquids for Groundboom application (21)	0.023	1.2	Garlic	20	80	0.53	570	0.027	36
Mixing/Loading Liquids for Groundboom application (22)	0.023	1.2	Peanuts	10	80	0.26	1100	0.014	73

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading Liquids for Groundboom application (23)	0.023	1.2	Potato	25	80	0.66	460	0.034	29
Mixing/Loading Liquids for Chemigation application (24)	0.023	1.2	Potato	25	350	2.9	100	0.15	6.7
Mixing/Loading Liquids for Aerial application (25)	0.023	1.2	Potato	25	350	2.9	100	0.15	6.7
Mixing/Loading Liquids for Groundboom application (26)	0.023	1.2	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.79	380	0.041	24
Mixing/Loading Liquids for High-Pressure HandWand application (27)	0.023	1.2	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.0049	61000	0.00026	3900
Mixing/Loading Liquids for Airblast application (28)	0.023	1.2	Foliar spray (magnolia tree)	6	20	0.039	7600	0.0021	490
Mixing/Loading Liquids for Groundboom application (29)	0.023	1.2	Tomato, pepper	7.50	80	0.20	1500	0.010	97
Mixing/Loading Liquids for Groundboom application (30)	0.023	1.2	Southern pine (seed orchard)	42.50	10	0.14	2100	0.0073	140
Mixing/Loading Liquids for Dip tank application (31)	0.023	1.2	Ornamental bulb soak and cut flowers	0.02	100 gals	0.00049	610000	0.000026	39000
Loading Granulars for Tractor-Drawn Spreaders application (32)	0.0069	1.7	Beans	1.50	80	0.012	25000	0.0029	340
Loading Granulars for Tractor-Drawn Spreaders application (33)	0.0069	1.7	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.24	1300	0.058	17
Loading Granulars for Tractor-Drawn Spreaders application (34)	0.0069	1.7	Golf course turf (tees/greens)	43.56	10	0.043	7000	0.011	95
Loading Granulars for Tractor-Drawn Spreaders application (35)	0.0069	1.7	Golf course turf (fairways)	43.56	40	0.17	1700	0.042	24
Loading Granulars for Tractor-Drawn Spreaders application (36)	0.0069	1.7	Sod farms	43.56	80	0.34	870	0.085	12
Loading Granulars for Tractor-Drawn Spreaders application (37)	0.0069	1.7	Cotton	2	200	0.039	7600	0.0097	100
Loading Granulars for Tractor-Drawn Spreaders application (38)	0.0069	1.7	Pepper	1.35	80	0.011	28000	0.0026	380
Loading Granulars for Tractor-Drawn Spreaders application (39)	0.0069	1.7	Potato	25	80	0.20	1500	0.049	21
Wettable Powders for Groundboom application (40)	0.17	43	beans(lima, snap, dried)	1.50	80	0.29	1000	0.074	14
Wettable Powders for Chemigation application (41)	0.17	43	beans(lima, snap, dried)	1.50	350	1.3	240	0.32	3.1

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Wettable Powders for Chemigation application (42)	0.17	43	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	26	12	6.5	0.16
Wettable Powders for Groundboom application (43)	0.17	43	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	5.8	51	1.5	0.68
Wettable Powders for Chemigation application (44)	0.17	43	commercial/industrial lawns	40.80	10	0.99	300	0.25	4
Wettable Powders for High-Pressure HandWand application (45)	0.17	43	commercial/industrial lawns	0.50	1000 gals	1.2	250	0.31	3.3
Wettable Powders for Groundboom application (46)	0.17	43	cotton	2	200	0.97	310	0.25	4.1
Wettable Powders for Chemigation application (47)	0.17	43	cotton	2	350	1.7	180	0.43	2.3
Wettable Powders for Chemigation application (48)	0.17	43	golf course turf (tees and greens)	40.80	10	0.99	300	0.25	4
Wettable Powders for Chemigation application (49)	0.17	43	golf course turf (fairways)	40.80	40	4	76	1	0.100
Wettable Powders for Chemigation application (50)	0.17	43	sod farms	40.80	350	35	8.7	8.8	0.11
Wettable Powders for Groundboom application (51)	0.17	43	sod farms	40.80	80	7.9	38	2	0.50
Wettable Powders for Groundboom application (52)	0.17	43	Peanuts	2	80	0.39	770	0.098	10
Wettable Powders for Chemigation application (53)	0.17	43	peanuts	2	350	1.7	180	0.43	2.3
Wettable Powders for Groundboom application (54)	0.17	43	pepper, tomato	7.50	80	1.5	210	0.37	2.7
Wettable Powders for Groundboom application (55)	0.17	43	pine (seed orchard)	37.50	10	0.91	330	0.23	4.3
Applicator									
Sprays for High-Pressure HandWand application (56)	0.64	79	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.034	8800	0.0042	240
Sprays for High-Pressure HandWand application (57)	0.64	79	commercial/industrial lawns, residential lawn	0.04	1000 gals	0.34	880	0.042	24
Sprays for High-Pressure HandWand application (58)	0.64	79	ornamentals (foliar application only)	1.50	1000 gals	14	22	1.7	0.59
Sprays for High-Pressure HandWand application (59)	0.64	79	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.034	8800	0.0042	240

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Sprays for Groundboom application (60)	0.014	0.74	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	0.48	630	0.025	39
Sprays for Groundboom application (61)	0.014	0.74	Cotton	2	200	0.08	3800	0.0042	240
Sprays for Groundboom application (62)	0.014	0.74	Peanuts	11.59	80	0.19	1600	0.0098	100
Sprays for Groundboom application (63)	0.014	0.74	Band treatment (dried beans, succulent beans, lima)	2	80	0.032	9400	0.0017	590
Sprays for Groundboom application (64)	0.014	0.74	Band treatment, soil treatment (garlic)	20	80	0.32	940	0.017	59
Sprays for High-Pressure HandWand application (65)	0.64	79	commercial industrial lawn	0.15	1000 gals	1.4	220	0.17	5.9
Sprays for Groundboom application (66)	0.014	0.74	Cotton	2	200	0.08	3800	0.0042	240
Sprays for Groundboom application (67)	0.014	0.74	Garlic	20	80	0.32	940	0.017	59
Sprays for Groundboom application (68)	0.014	0.74	Peanuts	10	80	0.16	1900	0.0085	120
Sprays for Groundboom application (69)	0.014	0.74	Potato	25	80	0.4	750	0.021	47
Sprays for Aerial application (70)	No Data	No Data	potato	25	350	No Data	No Data	No Data	No Data
Sprays for Groundboom application (71)	0.014	0.74	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.48	630	0.025	39
Sprays for High-Pressure HandWand application (72)	0.64	79	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.14	2200	0.017	59
Sprays for Airblast application (73)	0.24	4.5	Foliar spray (magnolia tree)	6	20	0.41	730	0.0077	130
Sprays for Groundboom application (74)	0.014	0.74	Tomato, pepper	7.50	80	0.12	2500	0.0063	160
Sprays for Groundboom application (75)	0.014	0.74	Southern pine (seed orchard)	42.50	10	0.085	3500	0.0045	220
Applying Granulars for Tractor-Drawn Spreaders application (76)	0.0072	1.2	Beans	1.50	80	0.012	24000	0.0021	490
Applying Granulars for Tractor-Drawn Spreaders application (77)	0.0072	1.2	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.25	1200	0.041	24
Applying Granulars for Tractor-Drawn Spreaders application (78)	0.0072	1.2	Golf course turf (tees/greens)	43.56	10	0.045	6700	0.0075	130

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Applying Granulars for Tractor-Drawn Spreaders application (79)	0.0072	1.2	Golf course turf (fairways)	43.56	40	0.18	1700	0.030	33
Applying Granulars for Tractor-Drawn Spreaders application (80)	0.0072	1.2	Sod farms	43.56	80	0.36	840	0.060	17
Applying Granulars for Tractor-Drawn Spreaders application (81)	0.0072	1.2	Cotton	2	200	0.041	7300	0.0069	150
Applying Granulars for Tractor-Drawn Spreaders application (82)	0.0072	1.2	Peanuts	2	80	0.016	18000	0.0027	360
Applying Granulars for Tractor-Drawn Spreaders application (83)	0.0072	1.2	Pepper	1.35	80	0.011	27000	0.0019	540
Applying Granulars for Tractor-Drawn Spreaders application (84)	0.0072	1.2	Potato	25	80	0.21	1500	0.034	29
Sprays for Groundboom application (85)	0.014	0.74	Beans(lima, snap, dried)	1.50	80	0.024	13000	0.0013	790
Sprays for Groundboom application (86)	0.014	0.74	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.48	630	0.025	39
Sprays for High-Pressure HandWand application (87)	0.64	79	commercial/industrial lawns	0.50	1000 gals	4.6	66	0.56	1.8
Sprays for Groundboom application (88)	0.014	0.74	Cotton	2	200	0.08	3800	0.0042	240
Sprays for Groundboom application (89)	0.014	0.74	Sod farms	40.80	80	0.65	460	0.035	29
Sprays for Groundboom application (89a)	0.014	0.74	Sod farms	32.67	80	0.52	570	0.028	36
Sprays for Groundboom application (90)	0.014	0.74	Peanuts	2	80	0.032	9400	0.0017	590
Sprays for Groundboom application (91)	0.014	0.74	Pepper, tomato	7.50	80	0.12	2500	0.0063	160
Sprays for Groundboom application (92)	0.014	0.74	Pine (seed orchard)	37.50	10	0.075	4000	0.0040	250
Flagger									
Flagging for Sprays application (93)	0.01	0.35	Potato	25	350	1.3	240	0.044	23
Mixer/Loader/App									
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	0.45	1.8	Ornamentals (herbaceous plants, woody shrubs and vines)	218	5	7	43	0.028	36
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	0.45	1.8	Ornamental and Lawn turf	32.67	5	1.1	290	0.0042	240
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	0.22	7.3	Commercial industrial lawns	43.56	5	0.68	440	0.023	44
Loading/Applying Granulars for Belly Grinder application (97)	9.3	62	ornamental lawns and turf	43.56	0.5	2.9	100	0.019	52

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Loading/Applying Granulars for Belly Grinder application (98)	9.3	62	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	14	21	0.096	10
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	0.22	7.3	Ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	0.34	880	0.011	88
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	8.6	1100	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5 gals	130	2.2	17	0.058
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	8.6	1100	ornamental (shade trees)	37.50	5 gals	23	13	2.9	0.34

[1]PPE1 dermal unit exposures represent long pants, long sleeved shirts, and chemical-resistant gloves. Values are reported in the PHED Surrogate Exposure Guide dated August 1998
[2]PPE1 inhalation unit exposures represent no respirator. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.
[3]Crops and use patterns are from PCNB labels
[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).
[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).
[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).
[7]Dermal MOE = short-term and intermediate-term endpoint for dermal NOAEL (300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 100.
[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion * Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).
[9]Inhalation MOE = short-term and intermediate-term endpoint for inhalation NOAEL (1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 100.

Table B3:Short Term and Intermediate Term Risk with PPE 2 (Single Layer Protection, Gloves, PF5 Respirator) for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixer/Loader									
Dry Flowables for High-Pressure HandWand application (1)	0.066	0.15	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.0035	85000	0.0000080	120000
Dry Flowables for Chemigation application (2)	0.066	0.15	Commercial/industrial lawns	32.67	10	0.31	970	0.00070	1400
Dry Flowables for High-Pressure HandWand application (3)	0.066	0.15	Commercial/industrial lawns, residential lawn	0.04	1000 gals	0.035	8500	0.000080	12000
Dry Flowables for Chemigation application (4)	0.066	0.15	Golf course turf (tees/greens)	32.67	10	0.31	970	0.00070	1400
Dry Flowables for Chemigation application (5)	0.066	0.15	Golf course turf (fairways)	32.67	40	1.2	240	0.0028	360
Dry Flowables for Chemigation application (6)	0.066	0.15	Sod farms	32.67	350	11	28	0.025	41
Dry Flowables for High-Pressure HandWand application (7)	0.066	0.15	Ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	1.4	210	0.0032	310
Dry Flowables for High-Pressure HandWand application (8)	0.066	0.15	Containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.0035	85000	0.0000080	120000
Dry Flowables for Groundboom application (9)	0.066	0.15	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	2.3	130	0.0051	190
Dry Flowables for Groundboom application (10)	0.066	0.15	Cotton	2	200	0.38	800	0.00086	1200
Dry Flowables for Groundboom application (11)	0.066	0.15	Peanuts	11.59	80	0.87	340	0.0020	500
Mixing/Loading Liquids for Groundboom application (12)	0.023	0.24	Band treatment (dried beans, succulent beans, lima)	2	80	0.053	5700	0.00055	1800
Mixing/Loading Liquids for Groundboom application (13)	0.023	0.24	Band treatment, soil treatment (garlic)	20	80	0.53	570	0.0055	180
Mixing/Loading Liquids for Chemigation application (14)	0.023	0.24	Ornamental lawn and turf	32.67	5	0.054	5600	0.00056	1800
Mixing/Loading Liquids for Chemigation application (15)	0.023	0.24	Commercial/industrial lawns	32.67	10	0.11	2800	0.0011	890
Mixing/Loading Liquids for Chemigation application (16)	0.023	0.24	Sod farms	32.67	350	3.8	80	0.039	26
Mixing/Loading Liquids for Chemigation application (16a)	0.023	0.24	Sod farms	32.67	80	0.86	350	0.0090	110
Mixing/Loading Liquids for Chemigation application (17)	0.023	0.24	Golf course turf	32.67	10	0.11	2800	0.0011	890
Mixing/Loading Liquids for Chemigation application (18)	0.023	0.24	Golf course turf (fairways)	32.67	40	0.43	700	0.0045	220
Mixing/Loading Liquids for High-Pressure HandWand application (19)	0.023	0.24	Commercial industrial lawn	0.15	1000 gals	0.049	6100	0.00051	1900

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading Liquids for Groundboom application (20)	0.023	0.24	Cotton	2	200	0.13	2300	0.0014	730
Mixing/Loading Liquids for Groundboom application (21)	0.023	0.24	Garlic	20	80	0.53	570	0.0055	180
Mixing/Loading Liquids for Groundboom application (22)	0.023	0.24	Peanuts	10	80	0.26	1100	0.0027	360
Mixing/Loading Liquids for Groundboom application (23)	0.023	0.24	Potato	25	80	0.66	460	0.0069	150
Mixing/Loading Liquids for Chemigation application (24)	0.023	0.24	Potato	25	350	2.9	100	0.03	33
Mixing/Loading Liquids for Aerial application (25)	0.023	0.24	Potato	25	350	2.9	100	0.03	33
Mixing/Loading Liquids for Groundboom application (26)	0.023	0.24	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.79	380	0.0082	120
Mixing/Loading Liquids for High-Pressure HandWand application (27)	0.023	0.24	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.0049	61000	0.000051	19000
Mixing/Loading Liquids for Airblast application (28)	0.023	0.24	Foliar spray (magnolia tree)	6	20	0.039	7600	0.00041	2400
Mixing/Loading Liquids for Groundboom application (29)	0.023	0.24	Tomato, pepper	7.50	80	0.20	1500	0.0021	490
Mixing/Loading Liquids for Groundboom application (30)	0.023	0.24	Southern pine (seed orchard)	42.50	10	0.14	2100	0.0015	690
Mixing/Loading Liquids for Dip tank application (31)	0.023	0.24	Ornamental bulb soak and cut flowers	0.02	100 gals	0.00049	610000	0.0000051	190000
Loading Granulars for Tractor-Drawn Spreaders application (32)	0.0069	0.34	Beans	1.50	80	0.012	25000	0.00058	1700
Loading Granulars for Tractor-Drawn Spreaders application (33)	0.0069	0.34	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.24	1300	0.012	86
Loading Granulars for Tractor-Drawn Spreaders application (34)	0.0069	0.34	Golf course turf (tees/greens)	43.56	10	0.043	7000	0.0021	470
Loading Granulars for Tractor-Drawn Spreaders application (35)	0.0069	0.34	Golf course turf (fairways)	43.56	40	0.17	1700	0.0085	120
Loading Granulars for Tractor-Drawn Spreaders application (36)	0.0069	0.34	Sod farms	43.56	80	0.34	870	0.017	59
Loading Granulars for Tractor-Drawn Spreaders application (37)	0.0069	0.34	Cotton	2	200	0.039	7600	0.0019	510
Loading Granulars for Tractor-Drawn Spreaders application (38)	0.0069	0.34	Pepper	1.35	80	0.011	28000	0.00052	1900
Loading Granulars for Tractor-Drawn Spreaders application (39)	0.0069	0.34	Potato	25	80	0.20	1500	0.0097	100

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Wettable Powders for Groundboom application (40)	0.17	8.6	Beans(lima, snap, dried)	1.50	80	0.29	1000	0.015	68
Wettable Powders for Chemigation application (41)	0.17	8.6	Beans(lima, snap, dried)	1.50	350	1.3	240	0.065	16
Wettable Powders for Chemigation application (42)	0.17	8.6	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	26	12	1.3	0.78
Wettable Powders for Groundboom application (43)	0.17	8.6	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	5.8	51	0.29	3.4
Wettable Powders for Chemigation application (44)	0.17	8.6	Commercial/industrial lawns	40.80	10	0.99	300	0.050	20
Wettable Powders for High-Pressure HandWand application (45)	0.17	8.6	Commercial/industrial lawns	0.50	1000 gals	1.2	250	0.061	16
Wettable Powders for Groundboom application (46)	0.17	8.6	Cotton	2	200	0.97	310	0.049	20
Wettable Powders for Chemigation application (47)	0.17	8.6	Cotton	2	350	1.7	180	0.086	12
Wettable Powders for Chemigation application (48)	0.17	8.6	Golf course turf (tees and greens)	40.80	10	0.99	300	0.050	20
Wettable Powders for Chemigation application (49)	0.17	8.6	Golf course turf (fairways)	40.80	40	4	76	0.20	5
Wettable Powders for Chemigation application (50)	0.17	8.6	Sod farms	40.80	350	35	8.7	1.8	0.57
Wettable Powders for Groundboom application (51)	0.17	8.6	Sod farms	40.80	80	7.9	38	0.40	2.5
Wettable Powders for Groundboom application (52)	0.17	8.6	Peanuts	2	80	0.39	770	0.020	51
Wettable Powders for Chemigation application (53)	0.17	8.6	Peanuts	2	350	1.7	180	0.086	12
Wettable Powders for Groundboom application (54)	0.17	8.6	Pepper, tomato	7.50	80	1.5	210	0.074	14
Wettable Powders for Groundboom application (55)	0.17	8.6	Pine (seed orchard)	37.50	10	0.91	330	0.046	22
Applicator									
Sprays for High-Pressure HandWand application (56)	0.64	16	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.034	8800	0.00086	1200
Sprays for High-Pressure HandWand application (57)	0.64	16	commercial/industrial lawns, residential lawn	0.04	1000 gals	0.34	880	0.0086	120
Sprays for High-Pressure HandWand application (58)	0.64	16	ornamentals (foliar application only)	1.50	1000 gals	14	22	0.34	2.9

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Sprays for High-Pressure HandWand application (59)	0.64	16	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.034	8800	0.00086	1200
Sprays for Groundboom application (60)	0.014	0.15	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	0.48	630	0.0051	190
Sprays for Groundboom application (61)	0.014	0.15	Cotton	2	200	0.08	3800	0.00086	1200
Sprays for Groundboom application (62)	0.014	0.15	Peanuts	11.59	80	0.19	1600	0.0020	500
Sprays for Groundboom application (63)	0.014	0.15	Band treatment (dried beans, succulent beans, lima)	2	80	0.032	9400	0.00034	2900
Sprays for Groundboom application (64)	0.014	0.15	Band treatment, soil treatment (garlic)	20	80	0.32	940	0.0034	290
Sprays for High-Pressure HandWand application (65)	0.64	16	commercial industrial lawn	0.15	1000 gals	1.4	220	0.034	29
Sprays for Groundboom application (66)	0.014	0.15	Cotton	2	200	0.08	3800	0.00086	1200
Sprays for Groundboom application (67)	0.014	0.15	Garlic	20	80	0.32	940	0.0034	290
Sprays for Groundboom application (68)	0.014	0.15	Peanuts	10	80	0.16	1900	0.0017	580
Sprays for Groundboom application (69)	0.014	0.15	Potato	25	80	0.4	750	0.0043	230
Sprays for Aerial application (70)	No Data	No Data	potato	25	350	No Data	No Data	No Data	No Data
Sprays for Groundboom application (71)	0.014	0.15	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.48	630	0.0051	190
Sprays for High-Pressure HandWand application (72)	0.64	16	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.14	2200	0.0034	290
Sprays for Airblast application (73)	0.24	0.9	Foliar spray (magnolia tree)	6	20	0.41	730	0.0015	650
Sprays for Groundboom application (74)	0.014	0.15	Tomato, pepper	7.50	80	0.12	2500	0.0013	780
Sprays for Groundboom application (75)	0.014	0.15	Southern pine (seed orchard)	42.50	10	0.085	3500	0.00091	1100
Applying Granulars for Tractor-Drawn Spreaders application (76)	0.0072	0.24	Beans	1.50	80	0.012	24000	0.00041	2400

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Applying Granulars for Tractor-Drawn Spreaders application (77)	0.0072	0.24	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.25	1200	0.0082	120
Applying Granulars for Tractor-Drawn Spreaders application (78)	0.0072	0.24	Golf course turf (tees/greens)	43.56	10	0.045	6700	0.0015	670
Applying Granulars for Tractor-Drawn Spreaders application (79)	0.0072	0.24	Golf course turf (fairways)	43.56	40	0.18	1700	0.0060	170
Applying Granulars for Tractor-Drawn Spreaders application (80)	0.0072	0.24	Sod farms	43.56	80	0.36	840	0.012	84
Applying Granulars for Tractor-Drawn Spreaders application (81)	0.0072	0.24	Cotton	2	200	0.041	7300	0.0014	730
Applying Granulars for Tractor-Drawn Spreaders application (82)	0.0072	0.24	Peanuts	2	80	0.016	18000	0.00055	1800
Applying Granulars for Tractor-Drawn Spreaders application (83)	0.0072	0.24	Pepper	1.35	80	0.011	27000	0.00037	2700
Applying Granulars for Tractor-Drawn Spreaders application (84)	0.0072	0.24	Potato	25	80	0.21	1500	0.0069	150
Sprays for Groundboom application (85)	0.014	0.15	Beans(lima, snap, dried)	1.50	80	0.024	13000	0.00026	3900
Sprays for Groundboom application (86)	0.014	0.15	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.48	630	0.0051	190
Sprays for High-Pressure HandWand application (87)	0.64	16	commercial/industrial lawns	0.50	1000 gals	4.6	66	0.11	8.8
Sprays for Groundboom application (88)	0.014	0.15	Cotton	2	200	0.08	3800	0.00086	1200
Sprays for Groundboom application (89)	0.014	0.15	Sod farms	40.80	80	0.65	460	0.0070	140
Sprays for Groundboom application (89a)	0.014	0.15	Sod farms	32.67	80	0.52	570	0.0056	180
Sprays for Groundboom application (90)	0.014	0.15	Peanuts	2	80	0.032	9400	0.00034	2900
Sprays for Groundboom application (91)	0.014	0.15	Pepper, tomato	7.50	80	0.12	2500	0.0013	780
Sprays for Groundboom application (92)	0.014	0.15	Pine (seed orchard)	37.50	10	0.075	4000	0.00080	1200
Flagger									
Flagging for Sprays application (93)	0.01	0.07	Potato	25	350	1.3	240	0.0088	110
Mixer/Loader/App									
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	0.45	No Data	ornamentals (herbaceous plants, woody shrubs and vines)	218	5	7	43	No Data	No Data
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	0.45	No Data	ornamental and Lawn turf	32.67	5	1.1	290	No Data	No Data

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	0.22	No Data	commercial industrial lawns	43.56	5	0.68	440	No Data	No Data
Loading/Applying Granulars for Belly Grinder application (97)	9.3	12	ornamental lawns and turf	43.56	0.5	2.9	100	0.0037	270
Loading/Applying Granulars for Belly Grinder application (98)	9.3	12	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	14	21	0.019	54
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	0.22	No Data	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	0.34	880	No Data	No Data
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	8.6	220	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5 gals	130	2.2	3.4	0.29
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	8.6	220	ornamental (shade trees)	37.50	5 gals	23	13	0.59	1.7

[1]PPE2 dermal unit exposures represent long pants and long sleeved shirts plus chemical-resistant gloves. Values are reported in the PHED Surrogate Exposure Guide dated August 1998

[2]PPE2 inhalation unit exposures represent a dust/mist respirator with a protection factor of 5. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.

[3]Crops and use patterns are from PCNB labels

[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).

[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).

[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[7]Dermal MOE = short-term and Intermediate-term endpoint for dermal NOAEL (300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 100.

[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[9]Inhalation MOE = short-term and Intermediate-term endpoint for inhalation NOAEL (1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 100.

Table B4: Short Term and Intermediate Term Risk with PPE 3 (Single Layer Protection, Gloves, PF10 Respirator) for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixer/Loader									
Dry Flowables for High-Pressure HandWand application (1)	0.066	0.077	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.0035	85000	0.0000041	240000
Dry Flowables for Chemigation application (2)	0.066	0.077	commercial/industrial lawns	32.67	10	0.31	970	0.00036	2800
Dry Flowables for High-Pressure HandWand application (3)	0.066	0.077	commercial/industrial lawns, residential lawn	0.04	1000 gals	0.035	8500	0.000041	24000
Dry Flowables for Chemigation application (4)	0.066	0.077	golf course turf (tees/greens)	32.67	10	0.31	970	0.00036	2800
Dry Flowables for Chemigation application (5)	0.066	0.077	golf course turf (fairways)	32.67	40	1.2	240	0.0014	700
Dry Flowables for Chemigation application (6)	0.066	0.077	sod farms	32.67	350	11	28	0.013	80
Dry Flowables for High-Pressure HandWand application (7)	0.066	0.077	ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	1.4	210	0.0017	610
Dry Flowables for High-Pressure HandWand application (8)	0.066	0.077	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.0035	85000	0.0000041	240000
Dry Flowables for Groundboom application (9)	0.066	0.077	soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	2.3	130	0.0026	380
Dry Flowables for Groundboom application (10)	0.066	0.077	cotton	2	200	0.38	800	0.00044	2300
Dry Flowables for Groundboom application (11)	0.066	0.077	peanuts	11.59	80	0.87	340	0.0010	980
Mixing/Loading Liquids for Groundboom application (12)	0.023	0.12	Band treatment (dried beans, succulent beans, lima)	2	80	0.053	5700	0.00027	3600
Mixing/Loading Liquids for Groundboom application (13)	0.023	0.12	Band treatment, soil treatment (garlic)	20	80	0.53	570	0.0027	360
Mixing/Loading Liquids for Chemigation application (14)	0.023	0.12	Ornamental lawn and turf	32.67	5	0.054	5600	0.00028	3600
Mixing/Loading Liquids for Chemigation application (15)	0.023	0.12	Commercial/industrial lawns	32.67	10	0.11	2800	0.00056	1800
Mixing/Loading Liquids for Chemigation application (16)	0.023	0.12	Sod farms	32.67	350	3.8	80	0.020	51
Mixing/Loading Liquids for Groundboom application (16a)	0.023	0.12	Sod farms	32.67	80	0.86	350	0.0045	220
Mixing/Loading Liquids for Chemigation application (17)	0.023	0.12	Golf course turf	32.67	10	0.11	2800	0.00056	1800
Mixing/Loading Liquids for Chemigation application (18)	0.023	0.12	Golf course turf (fairways)	32.67	40	0.43	700	0.0022	450
Mixing/Loading Liquids for High-Pressure HandWand application (19)	0.023	0.12	Commercial industrial lawn	0.15	1000 gals	0.049	6100	0.00026	3900

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading Liquids for Groundboom application (20)	0.023	0.12	Cotton	2	200	0.13	2300	0.00069	1500
Mixing/Loading Liquids for Groundboom application (21)	0.023	0.12	Garlic	20	80	0.53	570	0.0027	360
Mixing/Loading Liquids for Groundboom application (22)	0.023	0.12	Peanuts	10	80	0.26	1100	0.0014	730
Mixing/Loading Liquids for Groundboom application (23)	0.023	0.12	Potato	25	80	0.66	460	0.0034	290
Mixing/Loading Liquids for Chemigation application (24)	0.023	0.12	Potato	25	350	2.9	100	0.015	67
Mixing/Loading Liquids for Aerial application (25)	0.023	0.12	Potato	25	350	2.9	100	0.015	67
Mixing/Loading Liquids for Groundboom application (26)	0.023	0.12	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.79	380	0.0041	240
Mixing/Loading Liquids for High-Pressure HandWand application (27)	0.023	0.12	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.0049	61000	0.000026	39000
Mixing/Loading Liquids for Airblast application (28)	0.023	0.12	Foliar spray (magnolia tree)	6	20	0.039	7600	0.00021	4900
Mixing/Loading Liquids for Groundboom application (29)	0.023	0.12	Tomato, pepper	7.50	80	0.20	1500	0.0010	970
Mixing/Loading Liquids for Groundboom application (30)	0.023	0.12	Southern pine (seed orchard)	42.50	10	0.14	2100	0.00073	1400
Mixing/Loading Liquids for Dip tank application (31)	0.023	0.12	Ornamental bulb soak and cut flowers	0.02	100 gals	0.00049	610000	0.0000026	390000
Loading Granulars for Tractor-Drawn Spreaders application (32)	0.0069	0.17	Beans	1.50	80	0.012	25000	0.00029	3400
Loading Granulars for Tractor-Drawn Spreaders application (33)	0.0069	0.17	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.24	1300	0.0058	170
Loading Granulars for Tractor-Drawn Spreaders application (34)	0.0069	0.17	Golf course turf (tees/greens)	43.56	10	0.043	7000	0.0011	950
Loading Granulars for Tractor-Drawn Spreaders application (35)	0.0069	0.17	Golf course turf (fairways)	43.56	40	0.17	1700	0.0042	240
Loading Granulars for Tractor-Drawn Spreaders application (36)	0.0069	0.17	Sod farms	43.56	80	0.34	870	0.0085	120
Loading Granulars for Tractor-Drawn Spreaders application (37)	0.0069	0.17	Cotton	2	200	0.039	7600	0.00097	1000
Loading Granulars for Tractor-Drawn Spreaders application (38)	0.0069	0.17	Pepper	1.35	80	0.011	28000	0.00026	3800
Loading Granulars for Tractor-Drawn Spreaders application (39)	0.0069	0.17	Potato	25	80	0.20	1500	0.0049	210

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Wettable Powders for Groundboom application (40)	0.17	4.3	Beans(lima, snap, dried)	1.50	80	0.29	1000	0.0074	140
Wettable Powders for Chemigation application (41)	0.17	4.3	Beans(lima, snap, dried)	1.50	350	1.3	240	0.032	31
Wettable Powders for Chemigation application (42)	0.17	4.3	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	26	12	0.65	1.6
Wettable Powders for Groundboom application (43)	0.17	4.3	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	5.8	51	0.15	6.8
Wettable Powders for Chemigation application (44)	0.17	4.3	Commercial/industrial lawns	40.80	10	0.99	300	0.025	40
Wettable Powders for High-Pressure HandWand application (45)	0.17	4.3	Commercial/industrial lawns	0.50	1000 gals	1.2	250	0.031	33
Wettable Powders for Groundboom application (46)	0.17	4.3	Cotton	2	200	0.97	310	0.025	41
Wettable Powders for Chemigation application (47)	0.17	4.3	Cotton	2	350	1.7	180	0.043	23
Wettable Powders for Chemigation application (48)	0.17	4.3	Golf course turf (tees and greens)	40.80	10	0.99	300	0.025	40
Wettable Powders for Chemigation application (49)	0.17	4.3	Golf course turf (fairways)	40.80	40	4	76	0.10	1.00
Wettable Powders for Chemigation application (50)	0.17	4.3	Sod farms	40.80	350	35	8.7	0.88	1.1
Wettable Powders for Groundboom application (51)	0.17	4.3	Sod farms	40.80	80	7.9	38	0.20	5
Wettable Powders for Groundboom application (52)	0.17	4.3	Peanuts	2	80	0.39	770	0.0098	100
Wettable Powders for Chemigation application (53)	0.17	4.3	Peanuts	2	350	1.7	180	0.043	23
Wettable Powders for Groundboom application (54)	0.17	4.3	Pepper, tomato	7.50	80	1.5	210	0.037	27
Wettable Powders for Groundboom application (55)	0.17	4.3	Pine (seed orchard)	37.50	10	0.91	330	0.023	43
Applicator									
Sprays for High-Pressure HandWand application (56)	0.64	7.9	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.034	8800	0.00042	2400
Sprays for High-Pressure HandWand application (57)	0.64	7.9	Commercial/industrial lawns, residential lawn	0.04	1000 gals	0.34	880	0.0042	240
Sprays for High-Pressure HandWand application (58)	0.64	7.9	ornamentals (foliar application only)	1.50	1000 gals	14	22	0.17	5.9

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Sprays for High-Pressure HandWand application (59)	0.64	7.9	Containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.034	8800	0.00042	2400
Sprays for Groundboom application (60)	0.014	0.074	soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	0.48	630	0.0025	390
Sprays for Groundboom application (61)	0.014	0.074	cotton	2	200	0.08	3800	0.00042	2400
Sprays for Groundboom application (62)	0.014	0.074	peanuts	11.59	80	0.19	1600	0.00098	1000
Sprays for Groundboom application (63)	0.014	0.074	band treatment (dried beans, succulent beans, lima)	2	80	0.032	9400	0.00017	5900
Sprays for Groundboom application (64)	0.014	0.074	band treatment, soil treatment (garlic)	20	80	0.32	940	0.0017	590
Sprays for High-Pressure HandWand application (65)	0.64	7.9	Commercial industrial lawn	0.15	1000 gals	1.4	220	0.017	59
Sprays for Groundboom application (66)	0.014	0.074	cotton	2	200	0.08	3800	0.00042	2400
Sprays for Groundboom application (67)	0.014	0.074	garlic	20	80	0.32	940	0.0017	590
Sprays for Groundboom application (68)	0.014	0.074	peanuts	10	80	0.16	1900	0.00085	1200
Sprays for Groundboom application (69)	0.014	0.074	potato	25	80	0.4	750	0.0021	470
Sprays for Aerial application (70)	No Data	No Data	potato	25	350	No Data	No Data	No Data	No Data
Sprays for Groundboom application (71)	0.014	0.074	soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.48	630	0.0025	390
Sprays for High-Pressure HandWand application (72)	0.64	7.9	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.14	2200	0.0017	590
Sprays for Airblast application (73)	0.24	0.45	Foliar spray (magnolia tree)	6	20	0.41	730	0.00077	1300
Sprays for Groundboom application (74)	0.014	0.074	tomato, pepper	7.50	80	0.12	2500	0.00063	1600
Sprays for Groundboom application (75)	0.014	0.074	southern pine (seed orchard)	42.50	10	0.085	3500	0.00045	2200
Applying Granulars for Tractor-Drawn Spreaders application (76)	0.0072	0.12	Beans	1.50	80	0.012	24000	0.00021	4900

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Applying Granulars for Tractor-Drawn Spreaders application (77)	0.0072	0.12	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.25	1200	0.0041	240
Applying Granulars for Tractor-Drawn Spreaders application (78)	0.0072	0.12	Golf course turf (tees/greens)	43.56	10	0.045	6700	0.00075	1300
Applying Granulars for Tractor-Drawn Spreaders application (79)	0.0072	0.12	Golf course turf (fairways)	43.56	40	0.18	1700	0.0030	330
Applying Granulars for Tractor-Drawn Spreaders application (80)	0.0072	0.12	Sod farms	43.56	80	0.36	840	0.0060	170
Applying Granulars for Tractor-Drawn Spreaders application (81)	0.0072	0.12	Cotton	2	200	0.041	7300	0.00069	1500
Applying Granulars for Tractor-Drawn Spreaders application (82)	0.0072	0.12	Peanuts	2	80	0.016	18000	0.00027	3600
Applying Granulars for Tractor-Drawn Spreaders application (83)	0.0072	0.12	Pepper	1.35	80	0.011	27000	0.00019	5400
Applying Granulars for Tractor-Drawn Spreaders application (84)	0.0072	0.12	Potato	25	80	0.21	1500	0.0034	290
Sprays for Groundboom application (85)	0.014	0.074	beans(lima, snap, dried)	1.50	80	0.024	13000	0.00013	7900
Sprays for Groundboom application (86)	0.014	0.074	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.48	630	0.0025	390
Sprays for High-Pressure HandWand application (87)	0.64	7.9	Commercial/industrial lawns	0.50	1000 gals	4.6	66	0.056	18
Sprays for Groundboom application (88)	0.014	0.074	cotton	2	200	0.08	3800	0.00042	2400
Sprays for Groundboom application (89)	0.014	0.074	sod farms	40.80	80	0.65	460	0.0035	290
Sprays for Groundboom application (89a)	0.014	0.074	sod farms	32.67	80	0.52	570	0.0028	360
Sprays for Groundboom application (90)	0.014	0.074	Peanuts	2	80	0.032	9400	0.00017	5900
Sprays for Groundboom application (91)	0.014	0.074	pepper, tomato	7.50	80	0.12	2500	0.00063	1600
Sprays for Groundboom application (92)	0.014	0.074	pine (seed orchard)	37.50	10	0.075	4000	0.00040	2500
Flagger									
Flagging for Sprays application (93)	0.01	0.035	potato	25	350	1.3	240	0.0044	230
Mixer/Loader/App									
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	0.45	No Data	ornamentals (herbaceous plants, woody shrubs and vines)	218	5	7	43	No Data	No Data
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	0.45	No Data	ornamental and Lawn turf	32.67	5	1.1	290	No Data	No Data

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	0.22	No Data	commercial industrial lawns	43.56	5	0.68	440	No Data	No Data
Loading/Applying Granulars for Belly Grinder application (97)	9.3	6.2	Ornamental lawns and turf	43.56	0.5	2.9	100	0.0019	520
Loading/Applying Granulars for Belly Grinder application (98)	9.3	6.2	Ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	14	21	0.0096	100
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	0.22	No Data	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	0.34	880	No Data	No Data
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	8.6	110	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5 gals	130	2.2	1.7	0.58
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	8.6	110	ornamental (shade trees)	37.50	5 gals	23	13	0.29	3.4

[1]PPE3 dermal unit exposures represent long pants and long sleeved shirts plus chemical-resistant gloves. Values are reported in the PHED Surrogate Exposure Guide dated August 1998

[2]PPE3 inhalation unit exposures represent an organic-vapor-removing respirator with a protection factor of 10. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.

[3]Crops and use patterns are from PCNB labels

[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).

[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).

[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[7]Dermal MOE = short-term and intermediate-term endpoint for dermal NOAEL(300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 100.

[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion * Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[9]Inhalation MOE = short-term and intermediate-term endpoint for inhalation NOAEL (1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 100.

Table B 5: Short Term and Intermediate Term Risk with PPE 4 (Double Layer Protection, Gloves, No Respirator) for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixer/Loader									
Dry Flowables for High-Pressure HandWand application (1)	0.047	0.77	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.0025	120000	0.000041	24000
Dry Flowables for Chemigation application (2)	0.047	0.77	Commercial/industrial lawns	32.67	10	0.22	1400	0.0036	280
Dry Flowables for High-Pressure HandWand application (3)	0.047	0.77	Commercial/industrial lawns, residential lawn	0.04	1000 gals	0.025	12000	0.00041	2400
Dry Flowables for Chemigation application (4)	0.047	0.77	Golf course turf (tees/greens)	32.67	10	0.22	1400	0.0036	280
Dry Flowables for Chemigation application (5)	0.047	0.77	Golf course turf (fairways)	32.67	40	0.88	340	0.014	70
Dry Flowables for Chemigation application (6)	0.047	0.77	Sod farms	32.67	350	7.7	39	0.13	8
Dry Flowables for High-Pressure HandWand application (7)	0.047	0.77	Ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	1	300	0.017	61
Dry Flowables for High-Pressure HandWand application (8)	0.047	0.77	Containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.0025	120000	0.000041	24000
Dry Flowables for Groundboom application (9)	0.047	0.77	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	1.6	190	0.026	38
Dry Flowables for Groundboom application (10)	0.047	0.77	Cotton	2	200	0.27	1100	0.0044	230
Dry Flowables for Groundboom application (11)	0.047	0.77	Peanuts	11.59	80	0.62	480	0.010	98
Mixing/Loading Liquids for Groundboom application (12)	0.017	1.2	Band treatment (dried beans, succulent beans, lima)	2	80	0.039	7700	0.0027	360
Mixing/Loading Liquids for Groundboom application (13)	0.017	1.2	Band treatment, soil treatment (garlic)	20	80	0.39	770	0.027	36
Mixing/Loading Liquids for Chemigation application (14)	0.017	1.2	Ornamental lawn and turf	32.67	5	0.040	7600	0.0028	360
Mixing/Loading Liquids for Chemigation application (15)	0.017	1.2	Commercial/industrial lawns	32.67	10	0.079	3800	0.0056	180
Mixing/Loading Liquids for Chemigation application (16)	0.017	1.2	Sod farms	32.67	350	2.8	110	0.20	5.1
Mixing/Loading Liquids for Groundboom application (16a)	0.017	1.2	Sod farms	32.67	80	0.63	470	0.045	22
Mixing/Loading Liquids for Chemigation application (17)	0.017	1.2	Golf course turf	32.67	10	0.079	3800	0.0056	180
Mixing/Loading Liquids for Chemigation application (18)	0.017	1.2	Golf course turf (fairways)	32.67	40	0.32	950	0.022	45
Mixing/Loading Liquids for High-Pressure HandWand application (19)	0.017	1.2	Commercial industrial lawn	0.15	1000 gals	0.036	8200	0.0026	390

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading Liquids for Groundboom application (20)	0.017	1.2	Cotton	2	200	0.097	3100	0.0069	150
Mixing/Loading Liquids for Groundboom application (21)	0.017	1.2	Garlic	20	80	0.39	770	0.027	36
Mixing/Loading Liquids for Groundboom application (22)	0.017	1.2	Peanuts	10	80	0.19	1500	0.014	73
Mixing/Loading Liquids for Groundboom application (23)	0.017	1.2	Potato	25	80	0.49	620	0.034	29
Mixing/Loading Liquids for Chemigation application (24)	0.017	1.2	Potato	25	350	2.1	140	0.15	6.7
Mixing/Loading Liquids for Aerial application (25)	0.017	1.2	Potato	25	350	2.1	140	0.15	6.7
Mixing/Loading Liquids for Groundboom application (26)	0.017	1.2	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.58	510	0.041	24
Mixing/Loading Liquids for High-Pressure HandWand application (27)	0.017	1.2	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.0036	82000	0.00026	3900
Mixing/Loading Liquids for Airblast application (28)	0.017	1.2	Foliar spray (magnolia tree)	6	20	0.029	10000	0.0021	490
Mixing/Loading Liquids for Groundboom application (29)	0.017	1.2	Tomato, pepper	7.50	80	0.15	2100	0.010	97
Mixing/Loading Liquids for Groundboom application (30)	0.017	1.2	Southern pine (seed orchard)	42.50	10	0.10	2900	0.0073	140
Mixing/Loading Liquids for Dip tank application (31)	0.017	1.2	Ornamental bulb soak and cut flowers	0.02	100 gals	0.00036	820000	0.000026	39000
Loading Granulars for Tractor-Drawn Spreaders application (32)	0.0034	1.7	Beans	1.50	80	0.0058	51000	0.0029	340
Loading Granulars for Tractor-Drawn Spreaders application (33)	0.0034	1.7	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.12	2600	0.058	17
Loading Granulars for Tractor-Drawn Spreaders application (34)	0.0034	1.7	Golf course turf (tees/greens)	43.56	10	0.021	14000	0.011	95
Loading Granulars for Tractor-Drawn Spreaders application (35)	0.0034	1.7	Golf course turf (fairways)	43.56	40	0.085	3500	0.042	24
Loading Granulars for Tractor-Drawn Spreaders application (36)	0.0034	1.7	Sod farms	43.56	80	0.17	1800	0.085	12
Loading Granulars for Tractor-Drawn Spreaders application (37)	0.0034	1.7	Cotton	2	200	0.019	15000	0.0097	100
Loading Granulars for Tractor-Drawn Spreaders application (38)	0.0034	1.7	Pepper	1.35	80	0.0052	57000	0.0026	380
Loading Granulars for Tractor-Drawn Spreaders application (39)	0.0034	1.7	Potato	25	80	0.097	3100	0.049	21

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Wettable Powders for Groundboom application (40)	0.13	43	beans(lima, snap, dried)	1.50	80	0.22	1300	0.074	14
Wettable Powders for Chemigation application (41)	0.13	43	beans(lima, snap, dried)	1.50	350	0.98	310	0.32	3.1
Wettable Powders for Chemigation application (42)	0.13	43	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	20	15	6.5	0.16
Wettable Powders for Groundboom application (43)	0.13	43	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	4.5	67	1.5	0.68
Wettable Powders for Chemigation application (44)	0.13	43	commercial/industrial lawns	40.80	10	0.76	400	0.25	4
Wettable Powders for High-Pressure HandWand application (45)	0.13	43	commercial/industrial lawns	0.50	1000 gals	0.93	320	0.31	3.3
Wettable Powders for Groundboom application (46)	0.13	43	cotton	2	200	0.74	400	0.25	4.1
Wettable Powders for Chemigation application (47)	0.13	43	cotton	2	350	1.3	230	0.43	2.3
Wettable Powders for Chemigation application (48)	0.13	43	golf course turf (tees and greens)	40.80	10	0.76	400	0.25	4
Wettable Powders for Chemigation application (49)	0.13	43	golf course turf (fairways)	40.80	40	3	99	1	0.100
Wettable Powders for Chemigation application (50)	0.13	43	sod farms	40.80	350	27	11	8.8	0.11
Wettable Powders for Groundboom application (51)	0.13	43	sod farms	40.80	80	6.1	49	2	0.50
Wettable Powders for Groundboom application (52)	0.13	43	Peanuts	2	80	0.30	1000	0.098	10
Wettable Powders for Chemigation application (53)	0.13	43	peanuts	2	350	1.3	230	0.43	2.3
Wettable Powders for Groundboom application (54)	0.13	43	pepper, tomato	7.50	80	1.1	270	0.37	2.7
Wettable Powders for Groundboom application (55)	0.13	43	pine (seed orchard)	37.50	10	0.70	430	0.23	4.3
Applicator									
Sprays for High-Pressure HandWand application (56)	0.36	79	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.019	16000	0.0042	240
Sprays for High-Pressure HandWand application (57)	0.36	79	commercial/industrial lawns, residential lawn	0.04	1000 gals	0.19	1600	0.042	24
Sprays for High-Pressure HandWand application (58)	0.36	79	ornamentals (foliar application only)	1.50	1000 gals	7.7	39	1.7	0.59

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Sprays for High-Pressure HandWand application (59)	0.36	79	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.019	16000	0.0042	240
Sprays for Groundboom application (60)	0.011	0.74	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	0.38	800	0.025	39
Sprays for Groundboom application (61)	0.011	0.74	Cotton	2	200	0.063	4800	0.0042	240
Sprays for Groundboom application (62)	0.011	0.74	Peanuts	11.59	80	0.15	2100	0.0098	100
Sprays for Groundboom application (63)	0.011	0.74	Band treatment (dried beans, succulent beans, lima)	2	80	0.025	12000	0.0017	590
Sprays for Groundboom application (64)	0.011	0.74	Band treatment, soil treatment (garlic)	20	80	0.25	1200	0.017	59
Sprays for High-Pressure HandWand application (65)	0.36	79	commercial industrial lawn	0.15	1000 gals	0.77	390	0.17	5.9
Sprays for Groundboom application (66)	0.011	0.74	Cotton	2	200	0.063	4800	0.0042	240
Sprays for Groundboom application (67)	0.011	0.74	Garlic	20	80	0.25	1200	0.017	59
Sprays for Groundboom application (68)	0.011	0.74	Peanuts	10	80	0.13	2400	0.0085	120
Sprays for Groundboom application (69)	0.011	0.74	Potato	25	80	0.31	950	0.021	47
Sprays for Aerial application (70)	No Data	No Data	potato	25	350	No Data	No Data	No Data	No Data
Sprays for Groundboom application (71)	0.011	0.74	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.38	800	0.025	39
Sprays for High-Pressure HandWand application (72)	0.36	79	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.077	3900	0.017	59
Sprays for Airblast application (73)	0.22	4.5	Foliar spray (magnolia tree)	6	20	0.38	800	0.0077	130
Sprays for Groundboom application (74)	0.011	0.74	Tomato, pepper	7.50	80	0.094	3200	0.0063	160
Sprays for Groundboom application (75)	0.011	0.74	Southern pine (seed orchard)	42.50	10	0.067	4500	0.0045	220
Applying Granulars for Tractor-Drawn Spreaders application (76)	0.0042	1.2	Beans	1.50	80	0.0072	42000	0.0021	490

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Applying Granulars for Tractor-Drawn Spreaders application (77)	0.0042	1.2	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.14	2100	0.041	24
Applying Granulars for Tractor-Drawn Spreaders application (78)	0.0042	1.2	Golf course turf (tees/greens)	43.56	10	0.026	11000	0.0075	130
Applying Granulars for Tractor-Drawn Spreaders application (79)	0.0042	1.2	Golf course turf (fairways)	43.56	40	0.10	2900	0.030	33
Applying Granulars for Tractor-Drawn Spreaders application (80)	0.0042	1.2	Sod farms	43.56	80	0.21	1400	0.060	17
Applying Granulars for Tractor-Drawn Spreaders application (81)	0.0042	1.2	Cotton	2	200	0.024	13000	0.0069	150
Applying Granulars for Tractor-Drawn Spreaders application (82)	0.0042	1.2	Peanuts	2	80	0.0096	31000	0.0027	360
Applying Granulars for Tractor-Drawn Spreaders application (83)	0.0042	1.2	Pepper	1.35	80	0.0065	46000	0.0019	540
Applying Granulars for Tractor-Drawn Spreaders application (84)	0.0042	1.2	Potato	25	80	0.12	2500	0.034	29
Sprays for Groundboom application (85)	0.011	0.74	Beans(lima, snap, dried)	1.50	80	0.019	16000	0.0013	790
Sprays for Groundboom application (86)	0.011	0.74	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.38	800	0.025	39
Sprays for High-Pressure HandWand application (87)	0.36	79	commercial/industrial lawns	0.50	1000 gals	2.6	120	0.56	1.8
Sprays for Groundboom application (88)	0.011	0.74	Cotton	2	200	0.063	4800	0.0042	240
Sprays for Groundboom application (89)	0.011	0.74	Sod farms	40.80	80	0.51	580	0.035	29
Sprays for Groundboom application (89a)	0.011	0.74	Sod farms	32.67	80	0.41	730	0.028	36
Sprays for Groundboom application (90)	0.011	0.74	Peanuts	2	80	0.025	12000	0.0017	590
Sprays for Groundboom application (91)	0.011	0.74	Pepper, tomato	7.50	80	0.094	3200	0.0063	160
Sprays for Groundboom application (92)	0.011	0.74	Pine (seed orchard)	37.50	10	0.059	5100	0.0040	250
Flagger									
Flagging for Sprays application (93)	0.01	0.35	Potato	25	350	1.3	240	0.044	23
Mixer/Loader/App									
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	0.25	1.8	Ornamentals (herbaceous plants, woody shrubs and vines)	218	5	3.9	77	0.028	36
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	0.25	1.8	Ornamental and Lawn turf	32.67	5	0.58	510	0.0042	240

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	0.11	7.3	Commercial industrial lawns	43.56	5	0.34	880	0.023	44
Loading/Applying Granulars for Belly Grinder application (97)	No Data	62	ornamental lawns and turf	43.56	0.5	No Data	No Data	0.019	52
Loading/Applying Granulars for Belly Grinder application (98)	No Data	62	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	No Data	No Data	0.096	10
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	0.11	7.3	Ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	0.17	1800	0.011	88
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	6.2	1100	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5 gals	96	3.1	17	0.058
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	6.2	1100	ornamental (shade trees)	37.50	5 gals	17	18	2.9	0.34

[1]PPE4 dermal unit exposures represent coveralls worn over long pants and long sleeved shirts plus chemical-resistant gloves. Values are reported in the PHED Surrogate Exposure Guide dated August 1998

[2]PPE4 inhalation unit exposures represent no respirator. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.

[3]Crops and use patterns are from PCNB labels

[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).

[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).

[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[7]Dermal MOE = short-term and intermediate-term endpoint for dermal NOAEL (300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 100.

[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion * Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[9]Inhalation MOE = short-term and intermediate-term endpoint for inhalation NOAEL (1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 100.

Table B6: Short Term and Intermediate Term with PPE 5 (Double Layer Protection, Gloves, PF5 Respirator) for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixer/Loader									
Dry Flowables for High-Pressure HandWand application (1)	0.047	0.15	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.0025	120000	0.0000080	120000
Dry Flowables for Chemigation application (2)	0.047	0.15	Commercial/industrial lawns	32.67	10	0.22	1400	0.00070	1400
Dry Flowables for High-Pressure HandWand application (3)	0.047	0.15	Commercial/industrial lawns, residential lawn	0.04	1000 gals	0.025	12000	0.000080	12000
Dry Flowables for Chemigation application (4)	0.047	0.15	Golf course turf (tees/greens)	32.67	10	0.22	1400	0.00070	1400
Dry Flowables for Chemigation application (5)	0.047	0.15	Golf course turf (fairways)	32.67	40	0.88	340	0.0028	360
Dry Flowables for Chemigation application (6)	0.047	0.15	Sod farms	32.67	350	7.7	39	0.025	41
Dry Flowables for High-Pressure HandWand application (7)	0.047	0.15	Ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	1	300	0.0032	310
Dry Flowables for High-Pressure HandWand application (8)	0.047	0.15	Containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.0025	120000	0.0000080	120000
Dry Flowables for Groundboom application (9)	0.047	0.15	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	1.6	190	0.0051	190
Dry Flowables for Groundboom application (10)	0.047	0.15	Cotton	2	200	0.27	1100	0.00086	1200
Dry Flowables for Groundboom application (11)	0.047	0.15	Peanuts	11.59	80	0.62	480	0.0020	500
Mixing/Loading Liquids for Groundboom application (12)	0.017	0.24	Band treatment (dried beans, succulent beans, lima)	2	80	0.039	7700	0.00055	1800
Mixing/Loading Liquids for Groundboom application (13)	0.017	0.24	Band treatment, soil treatment (garlic)	20	80	0.39	770	0.0055	180
Mixing/Loading Liquids for Chemigation application (14)	0.017	0.24	Ornamental lawn and turf	32.67	5	0.040	7600	0.00056	1800
Mixing/Loading Liquids for Chemigation application (15)	0.017	0.24	Commercial/industrial lawns	32.67	10	0.079	3800	0.0011	890
Mixing/Loading Liquids for Chemigation application (16)	0.017	0.24	Sod farms	32.67	350	2.8	110	0.039	26
Mixing/Loading Liquids for Groundboom application (16a)	0.017	0.24	Sod farms	32.67	80	0.63	470	0.0090	110
Mixing/Loading Liquids for Chemigation application (17)	0.017	0.24	Golf course turf	32.67	10	0.079	3800	0.0011	890
Mixing/Loading Liquids for Chemigation application (18)	0.017	0.24	Golf course turf (fairways)	32.67	40	0.32	950	0.0045	220
Mixing/Loading Liquids for High-Pressure HandWand application (19)	0.017	0.24	Commercial industrial lawn	0.15	1000 gals	0.036	8200	0.00051	1900

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading Liquids for Groundboom application (20)	0.017	0.24	Cotton	2	200	0.097	3100	0.0014	730
Mixing/Loading Liquids for Groundboom application (21)	0.017	0.24	Garlic	20	80	0.39	770	0.0055	180
Mixing/Loading Liquids for Groundboom application (22)	0.017	0.24	Peanuts	10	80	0.19	1500	0.0027	360
Mixing/Loading Liquids for Groundboom application (23)	0.017	0.24	Potato	25	80	0.49	620	0.0069	150
Mixing/Loading Liquids for Chemigation application (24)	0.017	0.24	Potato	25	350	2.1	140	0.03	33
Mixing/Loading Liquids for Aerial application (25)	0.017	0.24	Potato	25	350	2.1	140	0.03	33
Mixing/Loading Liquids for Groundboom application (26)	0.017	0.24	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.58	510	0.0082	120
Mixing/Loading Liquids for High-Pressure HandWand application (27)	0.017	0.24	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.0036	82000	0.000051	19000
Mixing/Loading Liquids for Airblast application (28)	0.017	0.24	Foliar spray (magnolia tree)	6	20	0.029	10000	0.00041	2400
Mixing/Loading Liquids for Groundboom application (29)	0.017	0.24	Tomato, pepper	7.50	80	0.15	2100	0.0021	490
Mixing/Loading Liquids for Groundboom application (30)	0.017	0.24	Southern pine (seed orchard)	42.50	10	0.10	2900	0.0015	690
Mixing/Loading Liquids for Dip tank application (31)	0.017	0.24	Ornamental bulb soak and cut flowers	0.02	100 gals	0.00036	820000	0.0000051	190000
Loading Granulars for Tractor-Drawn Spreaders application (32)	0.0034	0.34	Beans	1.50	80	0.0058	51000	0.00058	1700
Loading Granulars for Tractor-Drawn Spreaders application (33)	0.0034	0.34	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.12	2600	0.012	86
Loading Granulars for Tractor-Drawn Spreaders application (34)	0.0034	0.34	Golf course turf (tees/greens)	43.56	10	0.021	14000	0.0021	470
Loading Granulars for Tractor-Drawn Spreaders application (35)	0.0034	0.34	Golf course turf (fairways)	43.56	40	0.085	3500	0.0085	120
Loading Granulars for Tractor-Drawn Spreaders application (36)	0.0034	0.34	Sod farms	43.56	80	0.17	1800	0.017	59
Loading Granulars for Tractor-Drawn Spreaders application (37)	0.0034	0.34	Cotton	2	200	0.019	15000	0.0019	510
Loading Granulars for Tractor-Drawn Spreaders application (38)	0.0034	0.34	Pepper	1.35	80	0.0052	57000	0.00052	1900
Loading Granulars for Tractor-Drawn Spreaders application (39)	0.0034	0.34	Potato	25	80	0.097	3100	0.0097	100

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Wettable Powders for Groundboom application (40)	0.13	8.6	Beans(lima, snap, dried)	1.50	80	0.22	1300	0.015	68
Wettable Powders for Chemigation application (41)	0.13	8.6	Beans(lima, snap, dried)	1.50	350	0.98	310	0.065	16
Wettable Powders for Chemigation application (42)	0.13	8.6	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	20	15	1.3	0.78
Wettable Powders for Groundboom application (43)	0.13	8.6	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	4.5	67	0.29	3.4
Wettable Powders for Chemigation application (44)	0.13	8.6	Commercial/industrial lawns	40.80	10	0.76	400	0.050	20
Wettable Powders for High-Pressure HandWand application (45)	0.13	8.6	Commercial/industrial lawns	0.50	1000 gals	0.93	320	0.061	16
Wettable Powders for Groundboom application (46)	0.13	8.6	Cotton	2	200	0.74	400	0.049	20
Wettable Powders for Chemigation application (47)	0.13	8.6	Cotton	2	350	1.3	230	0.086	12
Wettable Powders for Chemigation application (48)	0.13	8.6	Golf course turf (tees and greens)	40.80	10	0.76	400	0.050	20
Wettable Powders for Chemigation application (49)	0.13	8.6	Golf course turf (fairways)	40.80	40	3	99	0.20	5
Wettable Powders for Chemigation application (50)	0.13	8.6	Sod farms	40.80	350	27	11	1.8	0.57
Wettable Powders for Groundboom application (51)	0.13	8.6	Sod farms	40.80	80	6.1	49	0.40	2.5
Wettable Powders for Groundboom application (52)	0.13	8.6	Peanuts	2	80	0.30	1000	0.020	51
Wettable Powders for Chemigation application (53)	0.13	8.6	Peanuts	2	350	1.3	230	0.086	12
Wettable Powders for Groundboom application (54)	0.13	8.6	Pepper, tomato	7.50	80	1.1	270	0.074	14
Wettable Powders for Groundboom application (55)	0.13	8.6	Pine (seed orchard)	37.50	10	0.70	430	0.046	22
Applicator									
Sprays for High-Pressure HandWand application (56)	0.36	16	containerized nursery tock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.019	16000	0.00086	1200
Sprays for High-Pressure HandWand application (57)	0.36	16	commercial/industrial lawns, residential lawn	0.04	1000 gals	0.19	1600	0.0086	120
Sprays for High-Pressure HandWand application (58)	0.36	16	ornamentals (foliar application only)	1.50	1000 gals	7.7	39	0.34	2.9

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Sprays for High-Pressure HandWand application (59)	0.36	16	containerized nursery stock soil drench (pepper, tomato)	0.0038	1000 gals	0.019	16000	0.00086	1200
Sprays for Groundboom application (60)	0.011	0.15	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	0.38	800	0.0051	190
Sprays for Groundboom application (61)	0.011	0.15	Cotton	2	200	0.063	4800	0.00086	1200
Sprays for Groundboom application (62)	0.011	0.15	Peanuts	11.59	80	0.15	2100	0.0020	500
Sprays for Groundboom application (63)	0.011	0.15	Band treatment (dried beans, succulent beans, lima)	2	80	0.025	12000	0.00034	2900
Sprays for Groundboom application (64)	0.011	0.15	Band treatment, soil treatment (garlic)	20	80	0.25	1200	0.0034	290
Sprays for High-Pressure HandWand application (65)	0.36	16	commercial industrial lawn	0.15	1000 gals	0.77	390	0.034	29
Sprays for Groundboom application (66)	0.011	0.15	Cotton	2	200	0.063	4800	0.00086	1200
Sprays for Groundboom application (67)	0.011	0.15	Garlic	20	80	0.25	1200	0.0034	290
Sprays for Groundboom application (68)	0.011	0.15	Peanuts	10	80	0.13	2400	0.0017	580
Sprays for Groundboom application (69)	0.011	0.15	Potato	25	80	0.31	950	0.0043	230
Sprays for Aerial application (70)	No Data	No Data	potato	25	350	No Data	No Data	No Data	No Data
Sprays for Groundboom application (71)	0.011	0.15	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.38	800	0.0051	190
Sprays for High-Pressure HandWand application (72)	0.36	16	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.077	3900	0.0034	290
Sprays for Airblast application (73)	0.22	0.9	Foliar spray (magnolia tree)	6	20	0.38	800	0.0015	650
Sprays for Groundboom application (74)	0.011	0.15	Tomato, pepper	7.50	80	0.094	3200	0.0013	780
Sprays for Groundboom application (75)	0.011	0.15	Southern pine (seed orchard)	42.50	10	0.067	4500	0.00091	1100
Applying Granulars for Tractor-Drawn Spreaders application (76)	0.0042	0.24	Beans	1.50	80	0.0072	42000	0.00041	2400

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Applying Granulars for Tractor-Drawn Spreaders application (77)	0.0042	0.24	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.14	2100	0.0082	120
Applying Granulars for Tractor-Drawn Spreaders application (78)	0.0042	0.24	Golf course turf (tees/greens)	43.56	10	0.026	11000	0.0015	670
Applying Granulars for Tractor-Drawn Spreaders application (79)	0.0042	0.24	Golf course turf (fairways)	43.56	40	0.10	2900	0.0060	170
Applying Granulars for Tractor-Drawn Spreaders application (80)	0.0042	0.24	Sod farms	43.56	80	0.21	1400	0.012	84
Applying Granulars for Tractor-Drawn Spreaders application (81)	0.0042	0.24	Cotton	2	200	0.024	13000	0.0014	730
Applying Granulars for Tractor-Drawn Spreaders application (82)	0.0042	0.24	Peanuts	2	80	0.0096	31000	0.00055	1800
Applying Granulars for Tractor-Drawn Spreaders application (83)	0.0042	0.24	Pepper	1.35	80	0.0065	46000	0.00037	2700
Applying Granulars for Tractor-Drawn Spreaders application (84)	0.0042	0.24	Potato	25	80	0.12	2500	0.0069	150
Sprays for Groundboom application (85)	0.011	0.15	Beans(lima, snap, dried)	1.50	80	0.019	16000	0.00026	3900
Sprays for Groundboom application (86)	0.011	0.15	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.38	800	0.0051	190
Sprays for High-Pressure HandWand application (87)	0.36	16	commercial/industrial lawns	0.50	1000 gals	2.6	120	0.11	8.8
Sprays for Groundboom application (88)	0.011	0.15	Cotton	2	200	0.063	4800	0.00086	1200
Sprays for Groundboom application (89)	0.011	0.15	Sod farms	40.80	80	0.51	580	0.0070	140
Sprays for Groundboom application (89a)	0.011	0.15	Sod farms	32.67	80	0.41	730	0.0056	180
Sprays for Groundboom application (90)	0.011	0.15	Peanuts	2	80	0.025	12000	0.00034	2900
Sprays for Groundboom application (91)	0.011	0.15	Pepper, tomato	7.50	80	0.094	3200	0.0013	780
Sprays for Groundboom application (92)	0.011	0.15	Pine (seed orchard)	37.50	10	0.059	5100	0.00080	1200
Flagger									
Flagging for Sprays application (93)	0.01	0.07	Potato	25	350	1.3	240	0.0088	110
Mixer/Loader/App									
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	0.25	No Data	ornamentals (herbaceous plants, woody shrubs and vines)	218	5	3.9	77	No Data	No Data
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	0.25	No Data	ornamental and Lawn turf	32.67	5	0.58	510	No Data	No Data

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	0.11	No Data	commercial industrial lawns	43.56	5	0.34	880	No Data	No Data
Loading/Applying Granulars for Belly Grinder application (97)	No Data	12	ornamental lawns and turf	43.56	0.5	No Data	No Data	0.0037	270
Loading/Applying Granulars for Belly Grinder application (98)	No Data	12	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	No Data	No Data	0.019	54
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	0.11	No Data	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	0.17	1800	No Data	No Data
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	6.2	220	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5 gals	96	3.1	3.4	0.29
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	6.2	220	ornamental (shade trees)	37.50	5 gals	17	18	0.59	1.7

[1]PPE5 dermal unit exposures represent coveralls worn over long pants and long sleeved shirts plus chemical-resistant gloves. Values are reported in the PHED Surrogate Exposure Guide dated August 1998

[2]PPE5 inhalation unit exposures represent a dust/mist respirator with a protection factor of 5. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.

[3]Crops and use patterns are from PCNB labels

[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).

[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).

[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[7]Dermal MOE = short-term and intermediate-term endpoint for dermal NOAEL (300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 100.

[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion * Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[9]Inhalation MOE = short-term and intermediate-term endpoint for inhalation NOAEL (1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 100.

Table B7: Short Term and Intermediate Term Risk with PPE 6 (Double Layer Protection, Gloves, PF10 Respirator) for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixer/Loader									
Dry Flowables for High-Pressure HandWand application (1)	0.047	0.077	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.0025	120000	0.0000041	240000
Dry Flowables for Chemigation application (2)	0.047	0.077	commercial/industrial lawns	32.67	10	0.22	1400	0.00036	2800
Dry Flowables for High-Pressure HandWand application (3)	0.047	0.077	commercial/industrial lawns, residential lawn	0.04	1000 gals	0.025	12000	0.000041	24000
Dry Flowables for Chemigation application (4)	0.047	0.077	golf course turf (tees/greens)	32.67	10	0.22	1400	0.00036	2800
Dry Flowables for Chemigation application (5)	0.047	0.077	golf course turf (fairways)	32.67	40	0.88	340	0.0014	700
Dry Flowables for Chemigation application (6)	0.047	0.077	sod farms	32.67	350	7.7	39	0.013	80
Dry Flowables for High-Pressure HandWand application (7)	0.047	0.077	ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	1	300	0.0017	610
Dry Flowables for High-Pressure HandWand application (8)	0.047	0.077	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.0025	120000	0.0000041	240000
Dry Flowables for Groundboom application (9)	0.047	0.077	soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	1.6	190	0.0026	380
Dry Flowables for Groundboom application (10)	0.047	0.077	cotton	2	200	0.27	1100	0.00044	2300
Dry Flowables for Groundboom application (11)	0.047	0.077	peanuts	11.59	80	0.62	480	0.0010	980
Mixing/Loading Liquids for Groundboom application (12)	0.017	0.12	Band treatment (dried beans, succulent beans, lima)	2	80	0.039	7700	0.00027	3600
Mixing/Loading Liquids for Groundboom application (13)	0.017	0.12	Band treatment, soil treatment (garlic)	20	80	0.39	770	0.0027	360
Mixing/Loading Liquids for Chemigation application (14)	0.017	0.12	Ornamental lawn and turf	32.67	5	0.040	7600	0.00028	3600
Mixing/Loading Liquids for Chemigation application (15)	0.017	0.12	Commercial/industrial lawns	32.67	10	0.079	3800	0.00056	1800
Mixing/Loading Liquids for Chemigation application (16)	0.017	0.12	Sod farms	32.67	350	2.8	110	0.020	51
Mixing/Loading Liquids for Groundboom application (16a)	0.017	0.12	Sod farms	32.67	80	0.63	470	0.0045	220
Mixing/Loading Liquids for Chemigation application (17)	0.017	0.12	Golf course turf	32.67	10	0.079	3800	0.00056	1800
Mixing/Loading Liquids for Chemigation application (18)	0.017	0.12	Golf course turf (fairways)	32.67	40	0.32	950	0.0022	450
Mixing/Loading Liquids for High-Pressure HandWand application (19)	0.017	0.12	Commercial industrial lawn	0.15	1000 gals	0.036	8200	0.00026	3900

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading Liquids for Groundboom application (20)	0.017	0.12	Cotton	2	200	0.097	3100	0.00069	1500
Mixing/Loading Liquids for Groundboom application (21)	0.017	0.12	Garlic	20	80	0.39	770	0.0027	360
Mixing/Loading Liquids for Groundboom application (22)	0.017	0.12	Peanuts	10	80	0.19	1500	0.0014	730
Mixing/Loading Liquids for Groundboom application (23)	0.017	0.12	Potato	25	80	0.49	620	0.0034	290
Mixing/Loading Liquids for Chemigation application (24)	0.017	0.12	Potato	25	350	2.1	140	0.015	67
Mixing/Loading Liquids for Aerial application (25)	0.017	0.12	Potato	25	350	2.1	140	0.015	67
Mixing/Loading Liquids for Groundboom application (26)	0.017	0.12	Soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.58	510	0.0041	240
Mixing/Loading Liquids for High-Pressure HandWand application (27)	0.017	0.12	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.0036	82000	0.000026	39000
Mixing/Loading Liquids for Airblast application (28)	0.017	0.12	Foliar spray (magnolia tree)	6	20	0.029	10000	0.00021	4900
Mixing/Loading Liquids for Groundboom application (29)	0.017	0.12	Tomato, pepper	7.50	80	0.15	2100	0.0010	970
Mixing/Loading Liquids for Groundboom application (30)	0.017	0.12	Southern pine (seed orchard)	42.50	10	0.10	2900	0.00073	1400
Mixing/Loading Liquids for Dip tank application (31)	0.017	0.12	Ornamental bulb soak and cut flowers	0.02	100 gals	0.00036	820000	0.0000026	390000
Loading Granulars for Tractor-Drawn Spreaders application (32)	0.0034	0.17	Beans	1.50	80	0.0058	51000	0.00029	3400
Loading Granulars for Tractor-Drawn Spreaders application (33)	0.0034	0.17	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.12	2600	0.0058	170
Loading Granulars for Tractor-Drawn Spreaders application (34)	0.0034	0.17	Golf course turf (tees/greens)	43.56	10	0.021	14000	0.0011	950
Loading Granulars for Tractor-Drawn Spreaders application (35)	0.0034	0.17	Golf course turf (fairways)	43.56	40	0.085	3500	0.0042	240
Loading Granulars for Tractor-Drawn Spreaders application (36)	0.0034	0.17	Sod farms	43.56	80	0.17	1800	0.0085	120
Loading Granulars for Tractor-Drawn Spreaders application (37)	0.0034	0.17	Cotton	2	200	0.019	15000	0.00097	1000
Loading Granulars for Tractor-Drawn Spreaders application (38)	0.0034	0.17	Pepper	1.35	80	0.0052	57000	0.00026	3800
Loading Granulars for Tractor-Drawn Spreaders application (39)	0.0034	0.17	Potato	25	80	0.097	3100	0.0049	210

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Wettable Powders for Groundboom application (40)	0.13	4.3	Beans(lima, snap, dried)	1.50	80	0.22	1300	0.0074	140
Wettable Powders for Chemigation application (41)	0.13	4.3	Beans(lima, snap, dried)	1.50	350	0.98	310	0.032	31
Wettable Powders for Chemigation application (42)	0.13	4.3	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	20	15	0.65	1.6
Wettable Powders for Groundboom application (43)	0.13	4.3	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	4.5	67	0.15	6.8
Wettable Powders for Chemigation application (44)	0.13	4.3	Commercial/industrial lawns	40.80	10	0.76	400	0.025	40
Wettable Powders for High-Pressure HandWand application (45)	0.13	4.3	Commercial/industrial lawns	0.50	1000 gals	0.93	320	0.031	33
Wettable Powders for Groundboom application (46)	0.13	4.3	Cotton	2	200	0.74	400	0.025	41
Wettable Powders for Chemigation application (47)	0.13	4.3	Cotton	2	350	1.3	230	0.043	23
Wettable Powders for Chemigation application (48)	0.13	4.3	Golf course turf (tees and greens)	40.80	10	0.76	400	0.025	40
Wettable Powders for Chemigation application (49)	0.13	4.3	Golf course turf (fairways)	40.80	40	3	99	0.10	1.00
Wettable Powders for Chemigation application (50)	0.13	4.3	Sod farms	40.80	350	27	11	0.88	1.1
Wettable Powders for Groundboom application (51)	0.13	4.3	Sod farms	40.80	80	6.1	49	0.20	5
Wettable Powders for Groundboom application (52)	0.13	4.3	Peanuts	2	80	0.30	1000	0.0098	100
Wettable Powders for Chemigation application (53)	0.13	4.3	Peanuts	2	350	1.3	230	0.043	23
Wettable Powders for Groundboom application (54)	0.13	4.3	Pepper, tomato	7.50	80	1.1	270	0.037	27
Wettable Powders for Groundboom application (55)	0.13	4.3	Pine (seed orchard)	37.50	10	0.70	430	0.023	43
Applicator									
Sprays for High-Pressure HandWand application (56)	0.36	7.9	Containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	0.019	16000	0.00042	2400
Sprays for High-Pressure HandWand application (57)	0.36	7.9	Commercial/industrial lawns, residential lawn	0.04	1000 gals	0.19	1600	0.0042	240
Sprays for High-Pressure HandWand application (58)	0.36	7.9	ornamentals (foliar application only)	1.50	1000 gals	7.7	39	0.17	5.9

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Sprays for High-Pressure HandWand application (59)	0.36	7.9	Containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	0.019	16000	0.00042	2400
Sprays for Groundboom application (60)	0.011	0.074	soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	0.38	800	0.0025	390
Sprays for Groundboom application (61)	0.011	0.074	cotton	2	200	0.063	4800	0.00042	2400
Sprays for Groundboom application (62)	0.011	0.074	peanuts	11.59	80	0.15	2100	0.00098	1000
Sprays for Groundboom application (63)	0.011	0.074	band treatment (dried beans, succulent beans, lima)	2	80	0.025	12000	0.00017	5900
Sprays for Groundboom application (64)	0.011	0.074	band treatment, soil treatment (garlic)	20	80	0.25	1200	0.0017	590
Sprays for High-Pressure HandWand application (65)	0.36	7.9	Commercial industrial lawn	0.15	1000 gals	0.77	390	0.017	59
Sprays for Groundboom application (66)	0.011	0.074	cotton	2	200	0.063	4800	0.00042	2400
Sprays for Groundboom application (67)	0.011	0.074	garlic	20	80	0.25	1200	0.0017	590
Sprays for Groundboom application (68)	0.011	0.074	peanuts	10	80	0.13	2400	0.00085	1200
Sprays for Groundboom application (69)	0.011	0.074	potato	25	80	0.31	950	0.0021	470
Sprays for Aerial application (70)	No Data	No Data	potato	25	350	No Data	No Data	No Data	No Data
Sprays for Groundboom application (71)	0.011	0.074	soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.38	800	0.0025	390
Sprays for High-Pressure HandWand application (72)	0.36	7.9	Containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.077	3900	0.0017	590
Sprays for Airblast application (73)	0.22	0.45	Foliar spray (magnolia tree)	6	20	0.38	800	0.00077	1300
Sprays for Groundboom application (74)	0.011	0.074	tomato, pepper	7.50	80	0.094	3200	0.00063	1600
Sprays for Groundboom application (75)	0.011	0.074	southern pine (seed orchard)	42.50	10	0.067	4500	0.00045	2200
Applying Granulars for Tractor-Drawn Spreaders application (76)	0.0042	0.12	Beans	1.50	80	0.0072	42000	0.00021	4900

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Applying Granulars for Tractor-Drawn Spreaders application (77)	0.0042	0.12	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.14	2100	0.0041	240
Applying Granulars for Tractor-Drawn Spreaders application (78)	0.0042	0.12	Golf course turf (tees/greens)	43.56	10	0.026	11000	0.00075	1300
Applying Granulars for Tractor-Drawn Spreaders application (79)	0.0042	0.12	Golf course turf (fairways)	43.56	40	0.10	2900	0.0030	330
Applying Granulars for Tractor-Drawn Spreaders application (80)	0.0042	0.12	Sod farms	43.56	80	0.21	1400	0.0060	170
Applying Granulars for Tractor-Drawn Spreaders application (81)	0.0042	0.12	Cotton	2	200	0.024	13000	0.00069	1500
Applying Granulars for Tractor-Drawn Spreaders application (82)	0.0042	0.12	Peanuts	2	80	0.0096	31000	0.00027	3600
Applying Granulars for Tractor-Drawn Spreaders application (83)	0.0042	0.12	Pepper	1.35	80	0.0065	46000	0.00019	5400
Applying Granulars for Tractor-Drawn Spreaders application (84)	0.0042	0.12	Potato	25	80	0.12	2500	0.0034	290
Sprays for Groundboom application (85)	0.011	0.074	beans(lima, snap, dried)	1.50	80	0.019	16000	0.00013	7900
Sprays for Groundboom application (86)	0.011	0.074	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.38	800	0.0025	390
Sprays for High-Pressure HandWand application (87)	0.36	7.9	Commercial/industrial lawns	0.50	1000 gals	2.6	120	0.056	18
Sprays for Groundboom application (88)	0.011	0.074	cotton	2	200	0.063	4800	0.00042	2400
Sprays for Groundboom application (89)	0.011	0.074	sod farms	40.80	80	0.51	580	0.0035	290
Sprays for Groundboom application (89a)	0.011	0.074	sod farms	32.67	80	0.41	730	0.0028	360
Sprays for Groundboom application (90)	0.011	0.074	Peanuts	2	80	0.025	12000	0.00017	5900
Sprays for Groundboom application (91)	0.011	0.074	pepper, tomato	7.50	80	0.094	3200	0.00063	1600
Sprays for Groundboom application (92)	0.011	0.074	pine (seed orchard)	37.50	10	0.059	5100	0.00040	2500
Flagger									
Flagging for Sprays application (93)	0.01	0.035	potato	25	350	1.3	240	0.0044	230
Mixer/Loader/App									
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	0.25	No Data	ornamentals (herbaceous plants, woody shrubs and vines)	218	5	3.9	77	No Data	No Data
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	0.25	No Data	ornamental and turf	32.67	5	0.58	510	No Data	No Data

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	0.11	No Data	commercial industrial lawns	43.56	5	0.34	880	No Data	No Data
Loading/Applying Granulars for Belly Grinder application (97)	No Data	6.2	Ornamental lawns and turf	43.56	0.5	No Data	No Data	0.0019	520
Loading/Applying Granulars for Belly Grinder application (98)	No Data	6.2	Ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	No Data	No Data	0.0096	100
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	0.11	No Data	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	0.17	1800	No Data	No Data
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	6.2	110	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5 gals	96	3.1	1.7	0.58
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	6.2	110	ornamental (shade trees)	37.50	5 gals	17	18	0.29	3.4

[1]PPE6 dermal unit exposures represent coveralls worn over long pants and long sleeved shirts plus chemical-resistant gloves. Values are reported in the PHED Surrogate Exposure Guide dated August 1998

[2]PPE6 inhalation unit exposures represent an organic-vapor-removing respirator with a protection factor of 10. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.

[3]Crops and use patterns are from PCNB labels

[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).

[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).

[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[7]Dermal MOE = short-term and intermediate-term endpoint for dermal NOAEL (300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 100.

[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion * Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[9]Inhalation MOE = short-term and intermediate term endpoint for inhalation NOAEL (1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 100.

Table B8: Short Term and Intermediate Term Risk with Eng Control for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixer/Loader									
Dry Flowables for High-Pressure HandWand application (1)	No Data	No Data	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	No Data	No Data	No Data	No Data
Dry Flowables for Chemigation application (2)	No Data	No Data	commercial/industrial lawns	32.67	10	No Data	No Data	No Data	No Data
Dry Flowables for High-Pressure HandWand application (3)	No Data	No Data	commercial/industrial lawns, residential lawn	0.04	1000 gals	No Data	No Data	No Data	No Data
Dry Flowables for Chemigation application (4)	No Data	No Data	golf course turf (tees/greens)	32.67	10	No Data	No Data	No Data	No Data
Dry Flowables for Chemigation application (5)	No Data	No Data	golf course turf (fairways)	32.67	40	No Data	No Data	No Data	No Data
Dry Flowables for Chemigation application (6)	No Data	No Data	sod farms	32.67	350	No Data	No Data	No Data	No Data
Dry Flowables for High-Pressure HandWand application (7)	No Data	No Data	ornamentals (herbaceous plants, woody shrubs and vines)	1.50	1000gals	No Data	No Data	No Data	No Data
Dry Flowables for High-Pressure HandWand application (8)	No Data	No Data	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	No Data	No Data	No Data	No Data
Dry Flowables for Groundboom application (9)	No Data	No Data	soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	No Data	No Data	No Data	No Data
Dry Flowables for Groundboom application (10)	No Data	No Data	cotton	2	200	No Data	No Data	No Data	No Data
Dry Flowables for Groundboom application (11)	No Data	No Data	peanuts	11.59	80	No Data	No Data	No Data	No Data
Mixing/Loading Liquids for Groundboom application (12)	0.0086	0.083	band treatment (dried beans, succulent beans, lima)	2	80	0.020	15000	0.00019	5300
Mixing/Loading Liquids for Groundboom application (13)	0.0086	0.083	band treatment, soil treatment (garlic)	20	80	0.20	1500	0.0019	530
Mixing/Loading Liquids for Chemigation application (14)	0.0086	0.083	ornamental lawn and turf	32.67	5	0.020	15000	0.00019	5200
Mixing/Loading Liquids for Chemigation application (15)	0.0086	0.083	commercial/industrial lawns	32.67	10	0.040	7500	0.00039	2600
Mixing/Loading Liquids for Chemigation application (16)	0.0086	0.083	Sod farms	32.67	350	1.4	210	0.014	74
Mixing/Loading Liquids for Groundboom application (16a)	0.0086	0.083	Sod farms	32.67	80	0.32	930	0.0031	320
Mixing/Loading Liquids for Chemigation application (17)	0.0086	0.083	golf course turf	32.67	10	0.040	7500	0.00039	2600
Mixing/Loading Liquids for Chemigation application (18)	0.0086	0.083	golf course turf (fairways)	32.67	40	0.16	1900	0.0015	650
Mixing/Loading Liquids for High-Pressure HandWand application (19)	0.0086	0.083	commercial industrial lawn	0.15	1000 gals	0.018	16000	0.00018	5600

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Mixing/Loading Liquids for Groundboom application (20)	0.0086	0.083	cotton	2	200	0.049	6100	0.00047	2100
Mixing/Loading Liquids for Groundboom application (21)	0.0086	0.083	garlic	20	80	0.20	1500	0.0019	530
Mixing/Loading Liquids for Groundboom application (22)	0.0086	0.083	peanuts	10	80	0.098	3100	0.00095	1100
Mixing/Loading Liquids for Groundboom application (23)	0.0086	0.083	potato	25	80	0.25	1200	0.0024	420
Mixing/Loading Liquids for Chemigation application (24)	0.0086	0.083	potato	25	350	1.1	280	0.010	96
Mixing/Loading Liquids for Aerial application (25)	0.0086	0.083	potato	25	350	1.1	280	0.010	96
Mixing/Loading Liquids for Groundboom application (26)	0.0086	0.083	soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.29	1000	0.0028	350
Mixing/Loading Liquids for High-Pressure HandWand application (27)	0.0086	0.083	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	0.0018	160000	0.000018	56000
Mixing/Loading Liquids for Airblast application (28)	0.0086	0.083	foliar spray (magnolia tree)	6	20	0.015	20000	0.00014	7000
Mixing/Loading Liquids for Groundboom application (29)	0.0086	0.083	tomato, pepper	7.50	80	0.074	4100	0.00071	1400
Mixing/Loading Liquids for Groundboom application (30)	0.0086	0.083	southern pine (seed orchard)	42.50	10	0.052	5700	0.00050	2000
Mixing/Loading Liquids for Dip tank application (31)	0.0086	0.083	ornamental bulb soak and cut flowers	0.02	100 gals	0.00018	1600000	0.0000018	560000
Loading Granulars for Tractor-Drawn Spreaders application (32)	0.00017	0.034	beans	1.50	80	0.00029	1000000	0.000058	17000
Loading Granulars for Tractor-Drawn Spreaders application (33)	0.00017	0.034	soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.0058	51000	0.0012	860
Loading Granulars for Tractor-Drawn Spreaders application (34)	0.00017	0.034	golf course turf (tees/greens)	43.56	10	0.0011	280000	0.00021	4700
Loading Granulars for Tractor-Drawn Spreaders application (35)	0.00017	0.034	golf course turf (fairways)	43.56	40	0.0042	71000	0.00085	1200
Loading Granulars for Tractor-Drawn Spreaders application (36)	0.00017	0.034	sod farms	43.56	80	0.0085	35000	0.0017	590
Loading Granulars for Tractor-Drawn Spreaders application (37)	0.00017	0.034	cotton	2	200	0.00097	310000	0.00019	5100
Loading Granulars for Tractor-Drawn Spreaders application (38)	0.00017	0.034	pepper	1.35	80	0.00026	1100000	0.000052	19000
Loading Granulars for Tractor-Drawn Spreaders application (39)	0.00017	0.034	potato	25	80	0.0049	62000	0.00097	1000

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Wettable Powders for Groundboom application (40)	0.0098	0.24	Beans(lima, snap, dried)	1.50	80	0.017	18000	0.00041	2400
Wettable Powders for Chemigation application (41)	0.0098	0.24	Beans(lima, snap, dried)	1.50	350	0.074	4100	0.0018	560
Wettable Powders for Chemigation application (42)	0.0098	0.24	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	350	1.5	200	0.036	28
Wettable Powders for Groundboom application (43)	0.0098	0.24	Soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.34	890	0.0082	120
Wettable Powders for Chemigation application (44)	0.0098	0.24	Commercial/industrial lawns	40.80	10	0.057	5300	0.0014	710
Wettable Powders for High-Pressure HandWand application (45)	0.0098	0.24	Commercial/industrial lawns	0.50	1000 gals	0.07	4300	0.0017	580
Wettable Powders for Groundboom application (46)	0.0098	0.24	Cotton	2	200	0.056	5400	0.0014	730
Wettable Powders for Chemigation application (47)	0.0098	0.24	Cotton	2	350	0.098	3100	0.0024	420
Wettable Powders for Chemigation application (48)	0.0098	0.24	Golf course turf (tees and greens)	40.80	10	0.057	5300	0.0014	710
Wettable Powders for Chemigation application (49)	0.0098	0.24	Golf course turf (fairways)	40.80	40	0.23	1300	0.0056	180
Wettable Powders for Chemigation application (50)	0.0098	0.24	Sod farms	40.80	350	2	150	0.049	20
Wettable Powders for Groundboom application (51)	0.0098	0.24	Sod farms	40.80	80	0.46	660	0.011	89
Wettable Powders for Groundboom application (52)	0.0098	0.24	Peanuts	2	80	0.022	13000	0.00055	1800
Wettable Powders for Chemigation application (53)	0.0098	0.24	Peanuts	2	350	0.098	3100	0.0024	420
Wettable Powders for Groundboom application (54)	0.0098	0.24	Pepper, tomato	7.50	80	0.084	3600	0.0021	490
Wettable Powders for Groundboom application (55)	0.0098	0.24	Pine (seed orchard)	37.50	10	0.053	5700	0.0013	780
Applicator									
Sprays for High-Pressure HandWand application (56)	No Data	No Data	containerized nursery stock, soil drench (beans, brussels sprouts, cabbage, cauliflower)	0.0038	1000 gals	No Data	No Data	No Data	No Data
Sprays for High-Pressure HandWand application (57)	No Data	No Data	commercial/industrial lawns, residential lawn	0.04	1000 gals	No Data	No Data	No Data	No Data
Sprays for High-Pressure HandWand application (58)	No Data	No Data	ornamentals (foliar application only)	1.50	1000 gals	No Data	No Data	No Data	No Data

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Sprays for High-Pressure HandWand application (59)	No Data	No Data	containerized nursery stock, soil drench (pepper, tomato)	0.0038	1000 gals	No Data	No Data	No Data	No Data
Sprays for Groundboom application (60)	0.005	0.043	soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower)	30	80	0.17	1800	0.0015	680
Sprays for Groundboom application (61)	0.005	0.043	cotton	2	200	0.029	11000	0.00025	4100
Sprays for Groundboom application (62)	0.005	0.043	peanuts	11.59	80	0.066	4500	0.00057	1800
Sprays for Groundboom application (63)	0.005	0.043	band treatment (dried beans, succulent beans, lima)	2	80	0.011	26000	0.000098	10000
Sprays for Groundboom application (64)	0.005	0.043	band treatment, soil treatment (garlic)	20	80	0.11	2600	0.00098	1000
Sprays for High-Pressure HandWand application (65)	No Data	No Data	commercial industrial lawn	0.15	1000 gals	No Data	No Data	No Data	No Data
Sprays for Groundboom application (66)	0.005	0.043	cotton	2	200	0.029	11000	0.00025	4100
Sprays for Groundboom application (67)	0.005	0.043	garlic	20	80	0.11	2600	0.00098	1000
Sprays for Groundboom application (68)	0.005	0.043	peanuts	10	80	0.057	5300	0.00049	2000
Sprays for Groundboom application (69)	0.005	0.043	potato	25	80	0.14	2100	0.0012	810
Sprays for Aerial application (70)	0.005	0.068	potato	25	350	0.63	480	0.0085	120
Sprays for Groundboom application (71)	0.005	0.043	soil band treatment (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.17	1800	0.0015	680
Sprays for High-Pressure HandWand application (72)	No Data	No Data	containerized stock (broccoli, Chinese broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	0.02	1000 gals	No Data	No Data	No Data	No Data
Sprays for Airblast application (73)	0.019	0.45	Foliar spray (magnolia tree)	6	20	0.033	9200	0.00077	1300
Sprays for Groundboom application (74)	0.005	0.043	tomato, pepper	7.50	80	0.043	7000	0.00037	2700
Sprays for Groundboom application (75)	0.005	0.043	southern pine (seed orchard)	42.50	10	0.030	9900	0.00026	3800
Applying Granulars for Tractor-Drawn Spreaders application (76)	0.0021	0.22	Beans	1.50	80	0.0036	83000	0.00038	2700

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Applying Granulars for Tractor-Drawn Spreaders application (77)	0.0021	0.22	Soil band treatment (broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, mustard)	30	80	0.072	4200	0.0075	130
Applying Granulars for Tractor-Drawn Spreaders application (78)	0.0021	0.22	Golf course turf (tees/greens)	43.56	10	0.013	23000	0.0014	730
Applying Granulars for Tractor-Drawn Spreaders application (79)	0.0021	0.22	Golf course turf (fairways)	43.56	40	0.052	5700	0.0055	180
Applying Granulars for Tractor-Drawn Spreaders application (80)	0.0021	0.22	Sod farms	43.56	80	0.10	2900	0.011	91
Applying Granulars for Tractor-Drawn Spreaders application (81)	0.0021	0.22	Cotton	2	200	0.012	25000	0.0013	800
Applying Granulars for Tractor-Drawn Spreaders application (82)	0.0021	0.22	Peanuts	2	80	0.0048	63000	0.00050	2000
Applying Granulars for Tractor-Drawn Spreaders application (83)	0.0021	0.22	Pepper	1.35	80	0.0032	93000	0.00034	2900
Applying Granulars for Tractor-Drawn Spreaders application (84)	0.0021	0.22	Potato	25	80	0.06	5000	0.0063	160
Sprays for Groundboom application (85)	0.005	0.043	beans(lima, snap, dried)	1.50	80	0.0086	35000	0.000074	14000
Sprays for Groundboom application (86)	0.005	0.043	soil band treatment (broccoli, Chinese, broccoli, brussels sprouts, cabbage, Chinese cabbage, cauliflower, collards, kale, mustard)	30	80	0.17	1800	0.0015	680
Sprays for High-Pressure HandWand application (87)	No Data	No Data	commercial/industrial lawns	0.50	1000 gals	No Data	No Data	No Data	No Data
Sprays for Groundboom application (88)	0.005	0.043	cotton	2	200	0.029	11000	0.00025	4100
Sprays for Groundboom application (89)	0.005	0.043	sod farms	40.80	80	0.23	1300	0.0020	500
Sprays for Groundboom application (89a)	0.005	0.043	sod farms	32.67	80	0.19	1600	0.0016	620
Sprays for Groundboom application (90)	0.005	0.043	Peanuts	2	80	0.011	26000	0.000098	10000
Sprays for Groundboom application (91)	0.005	0.043	pepper, tomato	7.50	80	0.043	7000	0.00037	2700
Sprays for Groundboom application (92)	0.005	0.043	pine (seed orchard)	37.50	10	0.027	11000	0.00023	4300
Flagger									
Flagging for Sprays application (93)	0.00022	0.007	potato	25	350	0.028	11000	0.00088	1100
Mixer/Loader/App									
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (94)	No Data	No Data	ornamentals (herbaceous plants, woody shrubs and vines)	218	5	No Data	No Data	No Data	No Data
Mixing/Loading/Applying Liquids for Handgun (lawn) Sprayer (ORETF) application (95)	No Data	No Data	ornamental and lawn turf	32.67	5	No Data	No Data	No Data	No Data

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4] lbai/A or lb ai/gal	Daily Area Treated[5] A or gals	Dermal Dose (mg/kg/day)[6]	Dermal MOE [7]	Inhalation Dose (mg/kg/day)[8]	Inhalation MOE[9]
Loading/Applying Granulars for Push-type spreader (ORETF) application (96)	No Data	No Data	commercial industrial lawns	43.56	5	No Data	No Data	No Data	No Data
Loading/Applying Granulars for Belly Grinder application (97)	No Data	No Data	ornamental lawns and turf	43.56	0.5	No Data	No Data	No Data	No Data
Loading/Applying Granulars for Belly Grinder application (98)	No Data	No Data	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	No Data	No Data	No Data	No Data
Loading/Applying Granulars for Push-type spreader (ORETF) application (99)	No Data	No Data	ornamentals (shade trees, herbaceous, woody shrubs and vines)	217.80	0.5	No Data	No Data	No Data	No Data
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (100)	No Data	No Data	ornamental (woody shrubs and vines, herbaceous plants)	217.80	5 gals	No Data	No Data	No Data	No Data
Mixing/Loading/Applying Wet Powders for Low Pressure Handwand application (101)	No Data	No Data	ornamental (shade trees)	37.50	5 gals	No Data	No Data	No Data	No Data

[1]Engineering controls dermal unit exposures represent long pants and long sleeved shirts. For mixers and loaders, chemical-resistant gloves are also included. Values are reported in the PHED Surrogate Exposure Guide dated August 1998

[2]Engineering controls inhalation unit exposures represent no respirator. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.

[3]Crops and use patterns are from PCNB labels

[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).

[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).

[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[7]Dermal MOE = short-term and intermediate-term endpoint for dermal NOAEL (300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 100.

[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion * Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).

[9]Inhalation MOE = insert short-term and intermediate-term endpoint for inhalation NOAEL(1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 100.

Table B9: Occupational Seed Treatment Handler Short, Intermediate-term Exposure from PCNB at Baseline

Exposure Scenario	Crop	Baseline Dermal Unit Exposure (mg/lb ai)[a]	Baseline Inhalation Unit Exposure (µg/lb ai)[b]	Application Rate [c] lb ai/lbs of seed	Daily amount Treated[d] or planted (pounds)	Daily Dermal Dose	Daily Inhalation Dose	Dermal MOE	Inhalation MOE
Loader/Applicator (1)	Barley	0.023	0.34	0.001307	718000	0.308	0.005	973	219
	Bean			0.000523	575000	0.099	0.001	3036	685
	Corn			0.000523	550000	0.095	0.001	3174	716
	Cotton			0.002526	160000	0.133	0.002	2259	509
	Oats			0.001957	718000	0.462	0.007	650	147
	Pea			0.001045	575000	0.197	0.003	1520	343
	Peanut			0.000610	120000	0.024	0.000	12473	2813
	Rice			0.001391	718000	0.328	0.005	914	206
	Safflower			0.000610	718000	0.144	0.002	2085	470
	Sorghum			0.000305	718000	0.072	0.001	4169	940
	Soybeans			0.001045	575000	0.197	0.003	1520	343
	Sugar beet			0.001873	120000	0.074	0.001	4062	916
	Wheat			0.000525	718000	0.124	0.002	2422	546
Bagger (2)	Barley	0.0091	0.16	0.001307	718000	0.122	0.002	2459	466
	Bean			0.000523	575000	0.039	0.001	7674	1455
	Corn			0.000523	550000	0.037	0.001	8023	1521
	Cotton			0.002526	160000	0.053	0.001	5710	1082
	Oats			0.001957	718000	0.183	0.003	1642	311
	Pea			0.001045	575000	0.078	0.001	3841	728
	Peanut			0.000610	120000	0.010	0.000	31526	5977
	Rice			0.001391	718000	0.130	0.002	2311	438
	Safflower			0.000610	718000	0.057	0.001	5269	999

Exposure Scenario	Crop	Baseline Dermal Unit Exposure (mg/lb ai)[a]	Baseline Inhalation Unit Exposure (µg/lb ai)[b]	Application Rate [c] lb ai/lbs of seed	Daily amount Treated[d] or planted (pounds)	Daily Dermal Dose	Daily Inhalation Dose	Dermal MOE	Inhalation MOE
	Sorghum			0.000305	718000	0.028	0.001	10538	1998
	Soybeans			0.001045	575000	0.078	0.001	3841	728
	Sugar beet			0.001873	120000	0.029	0.001	10267	1947
	Wheat			0.000525	718000	0.049	0.001	6122	1161
Sewer (3)	Barley	0.0062	0.23	0.001307	718000	0.083	0.003	3609	324
	Bean			0.000523	575000	0.027	0.001	11263	1012
	Corn			0.000523	550000	0.025	0.001	11775	1058
	Cotton			0.002526	160000	0.036	0.001	8381	753
	Oats			0.001957	718000	0.124	0.005	2411	217
	Pea			0.001045	575000	0.053	0.002	5637	507
	Peanut			0.000610	120000	0.006	0.000	46272	4158
	Rice			0.001391	718000	0.088	0.003	3391	305
	Safflower			0.000610	718000	0.039	0.001	7734	695
	Sorghum			0.000305	718000	0.019	0.001	15467	1390
	Soybeans			0.001045	575000	0.053	0.002	5637	507
	Sugar beet			0.001873	120000	0.020	0.001	15070	1354
	Wheat			0.000525	718000	0.033	0.001	8986	807
Multiple activities (4)	Barley	0.042	1.6	0.001307	718000	0.563	0.021	533	47
	Bean			0.000523	575000	0.180	0.007	1663	146
	Corn			0.000523	550000	0.173	0.007	1738	152

Exposure Scenario	Crop	Baseline Dermal Unit Exposure (mg/lb ai)[a]	Baseline Inhalation Unit Exposure (µg/lb ai)[b]	Application Rate [c] lb ai/lbs of seed	Daily amount Treated[d] or planted (pounds)	Daily Dermal Dose	Daily Inhalation Dose	Dermal MOE	Inhalation MOE
	Cotton			0.002526	160000	0.024	0.009	1237	100
	Oats			0.001957	718000	0.843	0.032	356	31
	Pea			0.001045	575000	0.361	0.014	832	73
	Peanut			0.000610	120000	0.044	0.002	6831	598
	Rice			0.001391	718000	0.599	0.023	501	44
	Safflower			0.000610	718000	0.263	0.010	1142	100
	Sorghum			0.000305	718000	0.131	0.005	2283	200
	Soybeans			0.001045	575000	0.361	0.014	832	73
	Sugar beet			0.001873	120000	0.135	0.005	2225	195
	Wheat			0.000525	718000	0.226	0.009	1326	116
On-Farm Planter box (5)	Barley	12.6	1.2	0.000878	7200	1.138	0.000	264	9228
	Bean			0.000750	4000	0.540	0.000	556	19444
	Corn			0.000558	1440	0.145	0.000	2074	72597
	Cotton			0.001500	1200	0.320	0.000	926	32407
					3200	0.860	0.000	347	12152
	Oats			0.000604	7200	0.783	0.000	383	13414
	Pea			0.001042	6400	1.200	0.000	250	8747
	Peanut			0.000750	9280	1.253	0.000	240	8381
	Rice			0.000926	12000	2.000	0.000	150	5250
	Safflower			NA	NA	NA	NA	NA	NA
	Sorghum			NA	NA	NA	NA	NA	NA

Exposure Scenario	Crop	Baseline Dermal Unit Exposure (mg/lb ai)[a]	Baseline Inhalation Unit Exposure (µg/lb ai)[b]	Application Rate [c] lb ai/lbs of seed	Daily amount Treated[d] or planted (pounds)	Daily Dermal Dose	Daily Inhalation Dose	Dermal MOE	Inhalation MOE
	Soybeans			0.001044	4800	0.090	0.000	3326	116406
	Sugar beet			0.000625	400	0.045	0.000	6667	233333
	Wheat			0.000521	9600	0.900	0.000	333	11663
Planters	Barley	0.25	3.4	0.001307	18000	0.084	0.001	3571	875
	Bean			0.000523	10000	0.019	0.000	16061	3937
	Corn			0.000523	3600	0.00672	0.000	44614	10935
	Cotton			0.000788	3000	0.008	0.000	35533	8709
					8000	0.023	0.000	13325	3266
	Oats			0.001957	18000	0.126	0.002	2385	585
	Pea			0.001045	6400	0.024	0.000	12560	3078
	Peanut			0.000610	9280	0.020	0.000	14839	3637
	Rice			0.001391	30000	0.149	0.002	2013	493
	Safflower			0.000610	2400	0.005	0.000	57377	14063
	Sorghum			0.000305	640	0.001	0.000	430328	105473
	Soybeans			0.001045	12000	0.045	0.001	6699	1642
	Sugar beet			0.001873	400	0.003	0.000	112120	27480
	Wheat			0.000525	24000	0.045	0.001	6667	1634

Table B10: Short Term and Intermediate-Term Residential handler Risk for PCNB

Exposure Scenario (Scenario #)	Dermal Unit Exposure (mg/lb ai)[1]	Inhalation Unit Exposure (Ug/lb ai)[2]	Crop[3]	Application Rate[4]	Daily Area Treated[5]/ day	Dermal Dose (mg/kg/day)[6]
Applicator						
Applying Granulars for Hand application (1)	430	470	Residential Turf	32.67 lb ai /A	0.023 A	4.6
Mixer/Loader/App						
Mixing/Loading/Applying Liquids for Low Pressure Handwand application (2)	100	30	Residential Turf	0.15 lb ai /gal	5 gal	1.1
Mixing/Loading/Applying Liquids for Backpack sprayer application (3)	5.1	30	Residential Turf	0.15 lb ai /gal	5 gal	0.055
Mixing/Loading/Applying Liquids for Garden hose-end sprayer(ORETF - RTU) application (4)	2.61	11	Residential Turf	32.67 lb ai /A	0.5 A	0.61
Mixing/Loading/Applying Liquids for Garden hose-end sprayer(ORETF - conventional) application (5)	10.95	17	Residential Turf	32.67 lb ai /A	0.5 A	2.6
Loading/Applying Granulars for Belly Grinder application (6)	110	62	Residential Turf	32.67 lb ai /A	0.5 A	26
Loading/Applying Granulars for Push-type spreader (ORETF) application (7)	0.67	0.88	Residential Turf	32.67 lb ai /A	0.5 A	0.16
Loading/Applying Granulars for Push-type spreader (ORETF) application (8)	0.67	0.88	Residential Turf	43.56 lb ai /A	0.5 A	0.21

[1]Baseline dermal unit exposures represent long pants, long sleeved shirts, shoes, and socks. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.
[2]Baseline inhalation unit exposures represent no respirator. Values are reported in the PHED Surrogate Exposure Guide dated August 1998 or are from data submitted by the Outdoor Residential Exposure Task Force dated May 2000.
[3]Crops and use patterns are from PCNB labels and LUIS report
[4]Application rates are based on maximum values found in various sources including LUIS and various labels. In most scenarios, a range of maximum application rates is used to represent the range of rates for different crops/sites/uses. Most application rates upon which the analysis is based are presented as lb ai/A. In some cases, the application rate is based on applying a solution at concentrations specified by the label (i.e., presented as lb ai/gallon).
[5]Amount treated is based on the area or gallons that can be reasonably applied in a single day for each exposure scenario of concern based on the application method and formulation/packaging type. (Standard EPA/OPP/HED values).
[6]Dermal dose (mg/kg/day) = [unit exposure (mg/lb ai) * Dermal absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).
[7]Dermal MOE = short-term endpoint for dermal, such as oral NOAEL (300 mg/kg/day) / Daily Dermal Dose. Target Dermal MOE is 1000.
[8]Inhalation dose (mg/kg/day) = [unit exposure (ug/lb ai) * 0.001 mg/ g unit conversion * Inhalation absorption (100%) * Application rate (lb ai/acre or lb ai/gallon) * Daily area treated (acres or gallons)] / Body weight (70 kg).
[9]Inhalation MOE = oral NOAEL(1 mg/kg/day) / Daily Inhalation Dose. Target Inhalation MOE is 1000.

APPENDIX C

OCCUPATIONAL AND RESIDENTIAL POST APPLICATION

TABLES C1 - C4

Table C1 :PCNB Residential Postapplication Risk on Treated Turf (day 0)					
Activity	**Application Rate (lb ai/acre)**	**TTR 5% of application rate[a]**	**Transfer Coefficient (cm^2/hr)[b]**	**Dermal Dose (mg/kg/day)[c]**	**MOE[d]**
high contact lawn activities: adults	32.67	18.3	14,500	7.585	40
	43.56	24.4		10.114	30
high contact lawn activities: toddler	32.67	18.3	5200	2.720	110
	43.56	24.4		3.627	82
mowing turf: adults	32.67	18.3	500	0.262	1145
	43.56	24.4		0.349	860
golf course reentry: adult	32.67	18.3	500	0.523	575
	43.57	24.4		0.698	430

a TTR source: 5% of application rate, "Residential SOP Revised February 2001 " was used for determination of MOE's.

b Transfer coefficient from the Residential SOP's (02/01).

c Dermal dose = normalized TTR (µg/cm^2) x TC (cm^2/hr) x conversion factor (1 mg/1,000 µg) x exposure time (2 hrs/day playing or mowing; 4 hrs golfing) / body weight (70 kg adult or 15 kg child 1-6 yrs). Short term MOEs were calculated using DAT 0 residue values

d MOE = NOAEL (1mg/kg/day; based on a dermal study) / dermal dose

Note: TTR = turf transferable residue

Table C2 - Oral Exposure from Hand-to-Mouth Activity on PCNB Treated Turf									
Exposure Scenario	**Application Rate** (lb ai/acre)	**Percent Active Ingredient Dislodgeable**	**Surface Area** (cm^2)	**Hand to Mouth** (events/hr)	**Extraction by Saliva**	**Exposure Time** (hours)	**Body Weight** (kg)	**Average Daily Dose** (mg/kg/day)	**Oral MOE**
Short-term Exposures									
Hand to Mouth (turf)	32.67	5%	20	20	50%	2	15	0.488	2
	43.56							0.650	2
Intermediate-term Exposures									
Hand to Mouth (turf)	32.67	5%	20	9.5	50%	2	15	0.232	4
	43.56							0.309	3

$$\text{Oral Dose (mg/kg/day)} = \frac{\text{AR (lb ai) x CF x F x SA (cm}^2\text{) x EXT x FQ(events/hr) x ET(hrs/day) x (0.001mg/µg)}}{\text{BW (kg)}}$$

Where:

Dose = oral dose on day of application (mg/kg/day)
AR = application rate (lb ai/A)
CF = conversion factor (11.2) to convert lb ai/A to µg/cm^2 (1 lb ai/A x 4.54E-8µg/lb x 2.47E-8 A/cm^2 = 11.2 µg/cm^2)
F = fraction of residue dislodgeable from wet hands (unitless)
SA = surface area of 1 to 3 fingers (cm^2)
EXT = extraction rate by saliva (unitless)
FQ = frequency of hand-to-mouth events (events/hour)
ET = exposure duration (hours/day)
BW = body weight (kg)

Assumptions:
SA - The surface area of 1 to 3 finger is 20 cm^2
FQ - The frequency of hand-to-mouth events is 20 events per hour for short-term and 9.5 events per hour for intermediate-term
F - The fraction of residue dislodgeable from wet hands is 5%
EXT - The extraction rate by saliva is 50%.
ET - The time spent outdoors is 2 hours/day

Table C3 - Oral Exposure from Mouthing PCNBTreated Turf					
Exposure Scenario	**Application Rate** lb ai/acre	**Percent Active Ingredient Dislodgeable**	**Surface Area** (cm^2)	**Body Weight** (kg)	**Averag** (mg
Short-term Exposures					
Object (turf) to Mouth	32.67	20%	25	15	
	43.56				
Intermediate-term Exposures					
Object (turf) to Mouth	32.67	20%	25	15	
	43.56				

PDR = (AR * F-DR * CF * IgR * (1 mg/1000µg)

where:

PDR	=	potential dose rate (mg/day);
AR	=	application rate
F-DR	=	fraction of residue dislodgeable from contaminated object (20%)
CF	=	conversion factor to convert lb ai/A to µg/cm^2 (11.2)
IgR	=	ingestion rate for mouthing of grass per day (25 cm^2/day)

Table C4 - Oral Exposure from Incidental Soil Ingestion						
Exposure Scenario	**Application Rate** (lb ai/acre)	**% of Application Rate in Uppermost 1 cm of Soil** (fraction/cm)	**Ingestion Rate** (IgR) mg/day	**Body Weight** (kg)	**Average Daily Dose** (mg/kg/day)	**Oral MOE** (UF=1000)
Short-term Exposures						
Incidental Soil Ingestion	32.67	100%	100	15	0.0016	612
	43.56				0.0022	460
Intermediate-term Exposures						
Incidental Soil Ingestion	32.67	100%	100	15	0.0016	612
	43.56				0.0022	460

Oral Dose = $\frac{AR(\text{lb ai/A}) \times F(1.0/\text{cm}) \times IgR(\text{mg/day}) \times (4.54\text{E-}8\,\mu\text{g/lb}) \times (2.47\text{E-}8\ \text{A/cm}^2) \times (0.67\ \text{cm}^3/\text{g}) \times (1\text{E-}6\ \text{g/}\mu\text{g})}{\text{BW (kg)}}$

Where:

Dose = oral dose on day of application (mg/kg/day)
AR = application rate (lb ai/A)
F = fraction or residue retained on uppermost 1 cm of soil
IgR = ingestion rate of soil (mg/day)
CF1 = weight unit conversion factor to convert the lbs ai in the application rate to µg for the soil residue value (4.54×10^8 µg/lb)
CF2 = area unit conversion factor to convert the surface area units (ft^2) in the application rate to cm^2 for the SR value (2.47×10^{-8} acre/cm^2)
CF3 = volume to weight unit conversion factor to convert the volume units (cm^3) to weight units for the soil residue value (0.67 cm^3/g soil)
CF4 = weight unit conversion factor to convert the µg of residues on the soil to grams to provide units of mg/day (1E-6 g/µg)
BW = body weight (kg)

Assumptions:
F - The fraction or residue retained on uppermost 1 cm of soil is 100 percent based on soil incorporation into top 1 cm of soil after application (1.0/cm)
IgR - The ingestion rate of soil is 100 mg/day

APPENDIX D

SOURCE OF DATA

Tables D1-D3

Table D1. Occupational Exposure Scenario Descriptions, Assumptions and Data Sources for the Use of PCNB			
Exposure Scenario	**Data Source**	**Standard Assumptions**	**Comments**
Occupational Mixer/Loader Exposure			

Table D. Occupational Exposure Scenario Description, Assumptions and Data Sources for the Use of PCNB

Exposure Scenario	Data Source	Standard Assumptions	Comments
Mixing/Loading Wettable Powder Formulations	PHED V1.1	200, 80 and 40 acres by groundboom; 10 acres for soil directed drench application to ornamentals; 100 gallons for dip treatment	**Baseline:** "Best Available" grades: Dermal (22-35 replicates), ABC grade. Hand (7 replicates), ABC grade. Inhalation (44 replicates), ABC grade. Low confidence in dermal/ hand data due to the low number of hand replicates; medium confidence in inhalation data. **PPE:** The same dermal and inhalation data are used as for the baseline coupled, when needed, with a 50% protection factor to account for an additional layer of clothing and a 80% protection factor to account for the use of a dust/mist respirator. Gloved hand (24 replicates) are based on ABC grade data. Medium confidence in dermal/gloved hands data. **Engineering Controls (water soluble packets):** Hand (5 replicates) and dermal (6-15 replicates) exposure values are based on AB grade data. Inhalation (15 replicates) exposure value is based on all grade data. Low confidence in dermal/hand and inhalation data.
Mixing/Loading Dry Flowable Formulations	PHED V1.1	200, 80 and 40 acres by groundboom; 10 acres for soil directed drench application to ornamentals; 100 gallons for dip treatment	**Baseline:** Dermal (16-26 replicates); hand (7 replicates); and inhalation (23 replicates) exposure values are all based on AB grade data. Low confidence in hand/dermal data due to the low number of hand replicates. High confidence inhalation data. **PPE:** The same dermal and inhalation data are used as for the baseline coupled, when needed, with a 50% protection factor to account for an additional layer of clothing and a 80% protection factor to account for the use of a dust/mist respirator. Hand (21 replicates) exposure values are based on AB grade data. High confidence in the dermal/gloved hands data. **Engineering Controls (water soluble packets):** Hand (5 replicates) and dermal (6-15 replicates) exposure values are based on AB grade data. Inhalation (15 replicates) exposure value is based on all grade data. Low confidence in dermal/hand and inhalation data.
Mixing/Loading Liquid Formulations	PHED V1.1	1,200, 350, 80 acres for aerial/chemigation and 5 acres soil drench chemigation; 200, 80 and 40 acres and 10 acres for soil directed drench application to ornamentals all by groundboom; and 100 gallons for dip treatment	**Baseline:** Dermal (172-122 replicates); hand (53 replicates); and inhalation (85 replicates) exposure values are all based on AB grade data. High confidence in dermal/hands and inhalation data. **PPE:** The same dermal and inhalation data are used as for the baseline coupled, when needed, with a 50% protection factor to account for an additional layer of clothing and a 80% protection factor to account for the use of a dust/mist respirator. Gloved-hand (59 replicates) exposure value is based on is based on AB grade data. High confidence in the unit dermal/gloved-hand exposure value. **Engineering Controls: (closed mixing systems):** Dermal (31 replicates), hand (31 replicates), and inhalation (27 replicates) exposure values are based on AB grade data. High confidence in the dermal/gloved hand and inhalation unit exposure values. Empirical data include the use of chemical-resistant gloves.
oading Granular Formulations	PHED V1.1	80 acres for sod farms and 40 acres for golf course turf	**Baseline:** Hand (10 replicates) exposure values are based on all grade data, dermal (33-78) exposure values are based on ABC grade data , and inhalation (58 replicates) exposure values are based on AB grade data. Low confidence in dermal/hand data and high confidence in inhalation data. **PPE:** The same inhalation data are used as for the baseline coupled with an 80% protection factor to account for the use of a dust/mist respirator. Hand (45 replicates) and double layer (12-59 replicates) exposure values are based on ABC grade data. Medium confidence in single-layer/gloved hand data and low confidence in double-layer/ gloved hand data. **Engineering Controls (Lock 'n Load):** The same data are used as for baseline coupled with a 98% protection factor to account for Lock 'n Load.
Applicator Exposure			
Aerial Spray Application	PHED V1.1	350 acres	**Baseline and PPE:** insufficient data. **Engineering controls (enclosed cockpit):** Dermal (24 to 48 replicates) and inhalation (23 replicates) exposure values are based on ABC grade data. Hand (34 replicates) exposure value is based on AB grade data. Medium confidence in the dermal/hands and inhalation unit exposure values.

Table D1. Occupational Exposure Scenario Description, Assumptions and Data Sources for the Use of PCNB

Exposure Scenario	Data Source	Standard Assumptions	Comments
Ground boom Application	PHED V1.1	200, 80, 40 and 10 acres	**Baseline:** Dermal (23 to 42 replicates), hand (29 replicates) and inhalation (22 replicates) exposure values are based on AB grade data. High confidence in the unit exposure values. **PPE:** The same dermal and inhalation data are used as for the baseline coupled, if needed, with a 50% protection factor to account for an additional layer of clothing and an 80% protection factor to account for the use of a dust/mist respirator. Gloved-hand (21 replicates) exposure value is based on ABC grade data. Medium confidence in the dermal/gloved hand unit exposure value. **Engineering Controls (enclosed cab):** Dermal (20 to 31 replicates) and hand (16 replicates) exposure values are based on ABC grade data. Inhalation (16 replicates) exposure value is based on AB grade data. Medium confidence in dermal/hand unit exposure value, and high confidence in the inhalation unit exposure value.
Applying Granulars with a Tractor Drawn Spreader	PHED V1.1	40 acres	**Baseline:** Dermal (1-5 replicates); hand (5 replicates); and inhalation (5 replicates) exposure values are all based on AB grade data. Low confidence in the unit exposure values. **PPE:** The same dermal and inhalation data are used as for the baseline coupled, when needed, with a 50% protection factor to account for an additional layer of clothing and an 80% protection factor to account for the use of a dust/mist respirator. **Gloved-hand (0 replicates) exposure value is low confidence due to lack of data.** **Engineering Controls: (enclosed cab):** Dermal (2-30 replicates), gloved hand (24 replicates), and inhalation (37 replicates) exposure values are based on AB grade data. High confidence in the dermal/gloved hand unit exposure value. Low confidence in inhalation unit exposure value.
Applying a Dip Treatment	No data	100 gallons	No data
Mixer/Loader/Applicator Exposure			
Liquids Using a High Pressure Handwand	PHED V1.1	1,000 gallons	**Baseline:** Inhalation (13 replicates) exposure values are based on A grade data. Low confidence in inhalation data. **PPE:** The same inhalation data are used as for the baseline coupled, when needed, with an 80% protection factor to account for the use of a dust/mist respirator. Dermal (7 to 13 replicates) are based on AB grade data and gloved hand (7 to 13 replicates) is based on ABC grade data. Low confidence in the unit exposure value for dermal/gloved hands. Dermal data is coupled, when needed, with a 50% protection factor to account for an additional layer of clothing. **Engineering Controls:** Not considered plausible for this assessment.
Low Pressure Handwand - Liquid Formulation	PHED V1.1	0.5 acres or 40 gallons	**Baseline:** Dermal (9 to 80 replicates) and inhalation (80 replicates) exposure values are based on ABC grade data. Hand (70 replicates) exposure value is based on all grade data. Low confidence in the dermal/ hands unit exposure values. Medium confidence in the inhalation unit exposure value. **PPE:** The same dermal and inhalation data are used as for baseline coupled, if needed, with a 50% protection factor to account for the use of an additional layer of clothing and an 80% protection factor to account for the use of a dust/mist respirator. Gloved hand (10 replicates) exposure value is based on ABC grade data. Low confidence in dermal/gloved hand data. **Engineering Controls:** Not available for this assessment.
Dry Flowables with a Low Pressure Handwand	No data	0.5 acres or 40 gallons	No data
Backpack Sprayer - Liquid Formulation	PHED V1.1	5 acres	**Baseline:** Inhalation (11 replicates) exposure value is based on A grade data. Low confidence in the unit exposure value. No protection factors were needed to define the unit exposure value. **PPE:** Hand (11 replicates) exposure value data is based on C grade data. Dermal (9-11 replicates) exposure value is based on AB grade data. Low confidence in gloved hand/dermal data. Dermal data is coupled, when needed, with a 50% protection factor to account for an additional layer of clothing. The same inhalation data are used as for the baseline coupled with an 80% protection factor to account for the use of a dust/mist respirator. **Engineering Controls:** Not available for this assessment.

Table D. 1. Occupational Exposure Scenario Descriptions, Assumptions and Data Sources for the Use of PCNB[a]

Exposure Scenario	Data Source	Standard Assumptions	Comments
Mixing/Loading/Applying with a Lawn Handgun - Liquid Formulations (PCO)	ORETF Study OMA002	5 acres	**Baseline**: Inhalation (15 replicates) data were used to establish exposure values. **PPE**: The same inhalation data are used as for baseline coupled, if needed, with an 80% protection factor to account for the use of a dust/mist respirator. Dermal (15 replicates) and gloved hand (60 replicates) data were used to establish an exposure value. The dermal data are coupled, if needed, with a 50% protection factor to account for the use of an additional layer of clothing. **Engineering Controls**: Not available for this scenario.
Mixing/Loading/Applying with a Lawn Handgun -Dry Flowable Formulations (PCO)	ORETF Study OMA002	5 acres (broadcast); 0.05 acres (spot or drench)	**Baseline**: Inhalation (15 replicates) data were used to establish exposure values. **PPE**: The same inhalation data are used as for baseline coupled, if needed, with an 80% protection factor to account for the use of a dust/mist respirator. Dermal (15 replicates) and gloved hand (60 replicates) data were used to establish an exposure value. The dermal data are coupled, if needed, with a 50% protection factor to account for the use of an additional layer of clothing. **Engineering Controls**: Not available for this scenario.
Mixing/Loading/Applying with a Lawn Handgun - Wettable Powder Formulations (PCO)	ORETF Study OMA002	5 acres (broadcast); 0.05 acres (spot or drench)	Baseline: Inhalation (15 replicates) data were used to establish exposure values. **PPE**: The same inhalation data are used as for baseline coupled, if needed, with an 80% protection factor to account for the use of a dust/mist respirator. Dermal (15 replicates) and gloved hand (60 replicates) data were used to establish an exposure value. The dermal data are coupled, if needed, with a 50% protection factor to account for the use of an additional layer of clothing. **Engineering Controls**: Not available for this scenario.
Mixing/Loading/Applying a Dip Treatment	No data	100 gallons	No data
Flagger Exposure			
Flagging Aerial Sprays	PHED V1.1	350	**Baseline:** Dermal (18 to 28 replicates); hand (30 replicates); and inhalation (28 replicates) exposure values are based on AB grade data. High confidence in the unit exposure values. **PPE:** The same dermal and inhalation data are used as for the baseline coupled, if needed, with a 50% protection factor to account for the use of an additional layer of clothing and an 80% protection factor to account for the use of a dust/mist respirator. Hand (6 replicates) exposure value is based on AB grade data (not used). Low confidence in the gloved hand unit exposure value. **Engineering Controls (enclosed cab):** Data is based on groundboom enclosed cab.

Standard assumptions are based on the activities of a typical individual over a daily 8 hour interval. Occupational scenarios reflect what individuals could accomplish in an 8 hour workday.
Data quality assessments are based on the PHED grading criteria and the guidance provided in the Dec 1997 surrogate exposure table. Acceptable grades are matrices with grade A and/or B data. The PHED surrogate exposure table upon which this assessment is based was developed using the best data available in the system that are appropriate to the exposure scenario. Data confidence descriptors are assigned as follows:
High = grades A and B and 15 or more replicates;
Medium = grades A, B, and C and 15 or more replicates; and
Low = grades A, B, C, D, and E or any combination of grades with less than 15 replicates

Table D2. Residential Exposure Scenario Descriptions, Assumptions, and Data Sources for the Use of PCNB			
Exposure Scenario	**Data Source**	**Standard Assumptions[a]**	**Comments[b]**
Applying RTU Formulation with a Hose-End Sprayer	ORETF Study OMA004 MRID 449722-01	0.5 acres - ornamentals]	**Baseline:** Dermal, hand and inhalation (30 replicates each) data used to establish exposure values. Average laboratory and field recoveries were within guideline parameters; data of acceptable quality (AB grade).
Mixing/Loading/Applying with a Low Pressure Handwand - Liquid Formulations	SOPs for Residential Exposure Assessments (12/97)	5 gallons- ornamentals; or turf spot treatment to 0.023 acres (1,000 ft^2)	**Baseline**: Dermal (9-80 replicates) and inhalation (80 replicates) exposure values are based on ABC grade data, and hand (70 replicates) exposure value is based on All grade data. Low confidence in hand/dermal data. Medium confidence in inhalation data.
Mixing/Loading/Applying with a Backpack Sprayer	SOPs for Residential Exposure Assessments (12/97)	5 gallons- ornamentals; or turf spot treatment to 0.023 acres (1,000 ft^2)	**Baseline:** Dermal (9-11 replicates) exposure value is based on AB grade data, hand (11 replicates) exposure value is based on C grade data, and inhalation (11 replicates) exposure value is based on A grade data. Low confidence in hands/dermal and inhalation data. A 90% protection factor was used to "back calculate" the "no glove" hand scenario from gloved hand data.
Loading/Applying with a Push-type Granular Spreader	ORETF Study - OMA003 MRID 449722-01	0.5 acres	**Baseline:** Hand, dermal, and inhalation (30 replicates each) data used to establish exposure values. Average laboratory and field recoveries were within guideline parameters; data of acceptable quality (AB grade).

[a] Standard Assumptions based on HED estimates.

[b] "Best Available" grades are defined by HED SOP for meeting Subdivision U Guidelines. Best available grades are assigned as follows: matrices with grades A and B data and a minimum of 15 replicates; if not available, then grades A, B and C data and a minimum of 15 replicates; if not available, then all data regardless of the quality and number of replicates. Data confidence are assigned as follows:

High = grades A and B and 15 or more replicates per body part
Medium = grades A, B, and C and 15 or more replicates per body part
Low = grades A, B, C, D and E or any combination of grades with less than 15 replicates

Table D3 - Sources of Exposure Data Used to Assess Occupational Handler Risks of Seed Treatment

Exposure Scenario (Number)	Data Source	Comments
		Primary Mixer/Loader Descriptors
Loader Applicator (1)	Seed Treatment SOP	Taken from 3 studies (MRID 430800-49, 422519-02 and 447315-01). There were a total of 27 replicates. 20 replicates are from MRID 430800-49. Each replicate was a minimum of 3.5 hours. This study involved the treating of soybean seed with Apron using Gustafson XXXX Treaters at two facilities in the midwest. The chemical was manually added to the mix tanks from 1 GA jugs (15 replicates) or 3 lb water soluble bags (5 replicates). 12500 lbs of seed were treated per hour. Dermal exposure was measured using whole body dosimeters, handwashes and face wipes. Inhalation exposures were measured with glass fiber filters and XAD tubes. Field recovery was grade A for the handwashes and air filters and grade AB for the face wipe and whole body dosimeters. 6 replicates are from MRID 422519-02. The average duration of each replicate was 7.4 hours. This study involved the treating of canola with Oftanol technical at one facility in Canada with a 150 kg batch blending machine. The chemical was pumped to the mixing tank from a 55 GA drum. Each batch took five minutes. Dermal exposure was measured using patches and handwash. Inhalation exposures were measured using quartz microfiber filters. Field fortification recovery was grade A for all media. 1 replicate is from MRID 447315-01. This study involved the treating of canola with Vivavax RS flowable at one facility in Canada with a Gustafson Accu-treat film coater. The chemical was transferred to the mixing tank from a tote. Dermal exposure was measured using patches, handwashes, glove washes and face washes. Inhalation exposures were measured with glass fiber filters and XAD tubes. Field fortification recovery was grade AB for dermal media. The field recovery for the inhalation media was 220 percent. The laboratory recovery was grade A for both the dermal and inhalation all media.
Bagger (2)	Seed Treatment SOP	Taken from 3 studies (MRID 430800-49, 422519-02 and 447315-01). There were a total of 24 replicates. 20 replicates are from MRID 430800-49. The same bagging method was used at both facilities. The bagger clamped an empty bag to the bagging machine and the treated seed dropped into the bag. The seed flow stopped automatically and the filled bag dropped onto a conveyor belt. 3 replicates are from MRID 422519-02. The treated seed was transferred to a bagging hopper after passing through a compactor and shaker screen. The bagger attached a bag to the hopper and filled the bag. The bagger then removed the bag, carried it to a sewing station and sewed it with a hand held sewer. 1 replicate is from MRID 447315-01. This replicate was sampled during bag filling. Methods were the same as for the loader/ applicator with the exception that a full body dosimeter was used instead of patches.
Sewer (3)	Seed Treatment SOP	Taken from 2 studies (MRID 430800-49 and 447315-01). There were a total of 21 replicates 20 replicates are from MRID 430800-49. The same sewing method was used at both facilities. The sewer grabbed the bag, attached ID tags and guided it through the sewing and stamping machines. 1 replicate is from MRID 447315-01. This replicate was sampled during bag filling. Methods were the same as for the loader/ applicator with the exception that a full body dosimeter was used instead of patches.

Table D3 - Sources of Exposure Data Used to Assess Occupational Handler Risks of Seed Treatment

Exposure Scenario (Number)	Data Source	Comments
Multiple Activities (4)	Seed Treatment SOP	Taken from MRIDs 454427-01, 422519-02 , 449045-26 and 447315-01. There were a total of 66 replicates. 45 replicates are from MRID 454427-01. This study involved the treating of rice at three sites in the south with ICON 6.2 FS aqueous flowable using Gustafson PSD50-D3 treaters. A total of 45 workers were monitored with an average replicate time of 6.3 hours. These worker performed mixing/loading, bagging and clean-up. The product was added to the mix tanks from 30 gallon containers. The rice seed was dumped through the seed treater and stored in a bin until bagged. Dermal exposure was measured with whole body dosimeters, handwash and face/neck wipes. Inhalation exposures were measured with 37 mm filters and adsorption tubes. Dermal field recoveries were grade AB. Inhalation recoveries were grade A. 3 replicates are from MRID 422519-02. The shift foreman supervised the process and assisted with various tasks as necessary. 12 Replicates are from MRID 449045-26. This study involved the treating of wheat, barley, oats and peas at two sites in Canada using Vitaflow 280 packaged in 1000 liter totes or Vivavax Single packaged in a 200 liter drums. The replicates were one half day in length and involved a total of 5 workers. Workers loaded the formulation into the seed treater, operated the seed treater, bagged treated seed, transferred treated seed to storage bins or trucks, cleaned up the seed treatment area and cleaned up treated seed storage bins or the bagging area. Dermal exposure was measured with whole body dosimeters and **cotton gloves**. Inhalation exposures were measured with millipore filters. The dermal field fortification samples had highly variable recoveries possibly due to contamination. 6 replicates are from MRID 447315-01. 2 replicates stacked bags, 3 replicates did all tasks and 1 replicate did all tasks except loading.
Planter Box Seed Treatment (5)	Seed Treatment SOP	Taken from one study (MRID 470316-11). There were a total of 12 replicates at one site with four workers and the replicates ranged from 1.5 to 2 hours in duration. Workers loaded seed drill hoppers with wheat seed and a lindane/maned dust formulation. Dermal exposures were measured with patches and handwash. Inhalation exposures were measured with glass fiber filters. The field recovery was grade A for all media.
Seed Planter (6)	Seed Treatment SOP	Taken from MRIDs 456545-03 and 422519-01. There were a total of 26 replicates. 13 replicates are from MRID 456545-03 which involved the loading and drilling of seed treated with Baytan. The replicates were all located at different sites in the UK. The seed was loaded into the drill hoppers from 0.5 or 1 ton supersacks or 50 kg bags. The amount of seed handled ranged from 1100 to 12,100 lbs and the amount of ai handled ranged from 0.35 to 4.72 lbs. The loading time ranged from 19 to 83 minutes while the planting time ranged from 155 to 487 minutes. The seed planting rate per acre was not given in the review. The same worker performed both the loading and planting. Dermal exposure was measured with inner and outer whole body dosimeters which included a cap, a jacket and trousers over a long sleeve T-shirt and long johns and two sets of cotton gloves. The gloves were changed at the end of loading. Inhalation exposures were measured with 37 mm glass fiber filters and the filters were changed after loading. The dermal results were adjusted by a clothing protection factor to account for the fact that 5% of the outer residues was found on the inner dosimeters. Dermal and inhalation field recoveries were grade A. 13 replicates are from MRID 422519-01 which involved the loading and drilling of canola seed treated with Oftanol which forms a hard shell coating. The replicates were located at one site in Manitoba using four different planting rigs. Four workers participated and the replicates averaged 3.2 hours in duration. The seed was loaded into the drill hoppers from 25 kg bags. The amount of seed handled per replicate averaged 360 pounds and the amount of ai handled averaged 4.33 lbs. The seed was planted at a rate of 6 to 8 pounds per acre. The same worker performed both the loading and planting. Dermal exposure was measured with patches located both inside and outside the worker's coverall. Hand exposures were measured by handrinse. Inhalation exposures were measured with 37 mm quartz microfiber filters. Dermal and inhalation field recoveries were grade A.

- All handler exposure assessments in this document are based on the "Best Available" data as defined by the PHED SOP for meeting Subdivision U Guidelines (i.e., completing exposure assessments). Best available grades are assigned to data as follows: matrices with A and B grade data (i.e., Acceptable Grade Data) and a minimum of 15 replicates; if not available, then grades A, B and C data and a minimum of 15 replicates; if not available, then all data regardless of the quality (i.e., All Grade Data) and number of replicates. High quality data with a protection factor take precedence over low quality data with no protection factor.

- The generic data confidence categories are assigned as follows:
  High = grades A and B and 15 or more replicates per body part
  Medium = grades A, B, and C and 15 or more replicates per body part

Low = grades A, B, C, D and E or any combination of grades with less than 15 replicates.

- The data grades are as follows:
  - A = Field recovery is 70 to 120 percent. Lab recovery is 90 to 110 percent with a CV of ≤15 percent.
  - B = Field recovery is 50 to 120 percent. Lab recovery is 80 to 110 percent with a CV of ≤25 percent.
  - C = Field recovery is 30 to 120 percent. Lab recovery is 70 to 120 percent with a CV of ≤33 percent.
  - D = No field recovery data is available. Lab recovery is 60 to 120 percent with a CV of ≤33 percent.